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COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS

Sub-Committee of Experts on the Transport of Dangerous Goods

REPORT OF THE SUB-COMMITTEE OF EXPERTS ON ITS SEVENTEENTH SESSION

(Geneva, 6-15 December 1999)

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REPORT

ATTENDANCE

1. The Sub-Committee of Experts on the Transport of Dangerous Goods held its seventeenth session from 6 to 15 December 1999 with Mr. S. Benassi (Italy) as Chairman and Mr. F. Wybenga (United States of America) as Vice-Chairman.

2. Experts from the following countries took part in the session: Argentina; Australia; Belgium; Brazil; Canada; China; Czech Republic; France; Germany; Italy; Japan; Mexico; Netherlands; Norway; Russian Federation; South Africa; Spain; Sweden; United Kingdom and United States of America.

3. Under rule 72 of the rules of procedure of the Economic and Social Council, observers from the following countries also took part: Austria; Bahamas; Finland; Switzerland and Tunisia.

4. Representatives of the following specialized agencies were present: International Civil Aviation Organization (ICAO); International Labour Office (ILO).

5. The following intergovernmental organizations were represented: European Commission (EC); Intergovernmental Organization for International Carriage by Rail (OTIF) and Organization for Economic Co-operation and Development (OECD).

6. Representatives of the following non-governmental organizations took part in the discussion of items of concern to their organizations: European Liquefied Petroleum Gas Association (AEGPL); International Association of the Soap, Detergent and Maintenance Products Industry (AISE); European Chemical Industry Council (CEFIC); Compressed Gas Association (CGA); European Committee of Paint, Printing Ink Artists Colours Manufacturers Associations (CEPE); Chemical Specialities Manufacturers Association (CSMA); Standing Committee of European Doctors (CP); European Cylinder Makers Association (ECMA); European Fertilizer Manufacturers' Association (EFMA); European Industrial Gases Association (EIGA); Federation of European Aerosol Associations (FEA); International Federation of Freight Forwarders Associations (FIATA); Hazardous Materials Advisory Council (HMAC); International Air Transport Association (IATA); International Confederation of Container Reconditioners (ICCR); International Confederation of Drums Manufacturers (ICDM); International Council of Intermediate Bulk Container Associations (ICIBCA); International Confederation of Plastics Packaging Manufactuers (ICPP); International Electrotechnical Commission (IEC); International Fibre Drum Institute (IFDI); International Road Transport Union (IRU); International Organization for Standardization (ISO); International Tank Container Organization/Tank Container Association (ITCO/TCA); International Union of Railways (IUC); the Programme national de prévention de lutte et d'assistance humanitaire aux victimes des catastrophes naturelles (PRONAPLUCAN) and the European Secretariat of Manufacturers of Light Metal Packagings (SEFEL).

ADMINISTRATIVE MATTERS

Human resources

7. The Sub-Committee noted with satisfaction that the two vacant posts in the Dangerous Goods and Special Cargoes Section had finally been filled.

Report of the Secretary-General on the work of the Committee of Experts on the Transport of Dangerous Goods (document E/1999/43)

8. The Sub-Committee noted that the report had been discussed by the Council at its 1999 substantive session and that the two draft resolutions prepared by the Committee (see ST/SG/AC.10/25, annex 6) had been adopted without amendments on 30 July 1999 at the forty-sixth plenary meeting (resolution 1999/62) and on 26 October 1999 at the forty-eighth plenary meeting (resolution 1999/65).

9. The Sub-Committee agreed to come back to the question of the reconfiguration of the Committee under agenda item 6.

10. The representative of ILO expressed his organization's satisfaction at the adoption of resolution 1999/65 and thanked the Committee of Experts on the Transport of Dangerous Goods and the Sub-Committee for their constructive attitude regarding the elaboration of a new structure to permit the establishment of a Sub-Committee on matters concerning the globally harmonized system of classification and labelling of chemicals.

ADOPTION OF THE AGENDA (ST/SG/AC.10/C.3/33 and Add.1 and 2)

11. The Sub-Committee adopted the provisional agenda prepared by the secretariat after amending it to include late submissions (see informal documents INF.1 and INF.2) and, at the request of the expert from Argentina, document ST/SG/AC.10/C.3/R.707.

12. The Sub-Committee agreed that documents ST/SG/AC.10/C.3/1999/64 and -/C.3/1999/82 could be discussed under agenda item 6 (c) rather than under items 2 (a) and 5 (a), when the experts on aerosols would be present.

DEVELOPMENT OF PROVISIONS FOR THE TRANSPORT OF GASES

Documents: ST/SG/AC.10/C.3/32/Add.1 (Report of the in-session working group held during the sixteenth session of the Sub-Committee)

Informal documents: INF.10 (United Kingdom)
INF.14 (ISO)
INF.15 (United States of America)
INF.18 (Germany)

13. After the introduction of the informal documents by their authors in turn, the Sub-Committee discussed at length the basic question of how the requirements of Chapter 6.2 should be presented. The working group had agreed that the chapter in question should contain general requirements for design and construction in order to define the regulatory framework, to which would be added a list of standards considered acceptable by the Committee.

14. The expert from the United States of America questioned this approach; he considered that it was unnecessary to reproduce the essential requirements in this chapter since they were already contained in detail in the standards. He considered that defining the essential requirements, leaving the competent authorities the responsibility of specifying which standards could be applied in order to comply with them, was not conducive to harmonization in the context of international transport and would not improve the present situation. He would therefore prefer a reference to a single standard for each type of pressure receptacle which would guarantee a uniform level of safety acceptable to all the competent authorities.

15. After lengthy discussion, the Chairman summed up the Sub-Committee's position as follows:

- it was understood that the application of the ISO standards was a means of complying with the requirements of the United Nations Model Regulations;
- other standards could be applied provided that the Committee recognized that they ensured an equivalent or higher level of safety;
- when no standard existed to which the Model Regulations could refer, the requirements should be included in the Model Regulations;
- when satisfactory standards existed, it must still be determined whether it was necessary to include the essential requirements (in order to establish a minimum safety level to be met by the standardization organizations in their future work) or whether they could be omitted and only those standards deemed acceptable prescribed.

16. The consideration of the documents was entrusted to a working group which met from 6 to 9 December with Mr. H. Puype (EIGA) as chairman.

17. The chairman of the working group introduced the group's report (informal document INF.43) (see annex 1). The revised texts resulting from this work would be the subject of an addendum to the present report (ST/SG/AC.10/C.3/34/Add.1) and delegations wishing to submit proposals concerning these texts were requested to do so officially before the deadline for the submission of documents (14 April 2000) for the next session, when the working group would meet again.

TRANSPORT IN BULK IN PORTABLE TANKS AND FREIGHT CONTAINERS

(a) Miscellaneous draft amendments to Chapters 4.2 and 6.6

Documents: ST/SG/AC.10/1999/3 (Argentina)
ST/SG/AC.10/C.3/1999/66 (UIC)

Informal document: INF.23 (UIC)

18. With reference to the first comment by the expert from Argentina on the definitions of maximum allowable working pressure (MAWP) and design pressure in paragraph 6.7.2.1, the representative of UIC pointed out that there were two different systems in the Model Regulations to determine the test pressure. It was either possible to use the minimum test pressures given in 4.2.4.2.6 for specific substances, which was the most practical solution for tank-container transport operators, or the definitions of 6.7.2.1. could be used as a basis. According to these definitions, it was possible to establish a correlation between the design pressure and the test pressure and between the MAWP and the test pressure, and that for professionals of transport in tanks who wished to carry a maximum of different products in their tanks it would be more practical to establish the MAWP and the design pressure by means of a formula based on the minimum test pressure for these products rather than according to the physical characteristics of each substance to be carried. The definitions of 6.7.2.1 could be used for those tanks intended for the carriage of a specific product with known characteristics.

19. Some delegations supported the UIC opinion, but others considered that this proposal should be the subject of an official document comprising detailed arguments and specific proposals for the amendment of the text to enable the authorities responsible for implementing these requirements to evaluate the consequences.

20. The expert from Argentina said that discussion with other experts on the Sub-Committee had enabled him to resolve the other problems of interpretation raised in his document.

(b) New provisions for the transport of solid substances in tanks

Document: ST/SG/AC.10/C.3/1999/93 (Germany)

21. The expert from Germany said that the proposals contained in section 2.1 of the document should incorporate the provisions of the IMDG Code for the carriage in tanks of powdery or granular solid substances. The proposals were adopted with some amendments (see annex 2). They should also be applied to pasty solids which were not considered to be liquids and were carried in tanks.

22. The Sub-Committee agreed that the provisions should also be prescribed for elevated temperature substances; the proposals contained in section 2.2 of the document submitted by Germany were, however, referred to an informal working group for preliminary consideration.

23. The Sub-Committee adopted the texts submitted by the informal group (for paragraphs 6.7.2.1, 6.7.2.2.17 and 6.7.2.5.12 to 6.7.2.5.15) (informal document INF.37) (see annex 2). The expert from Germany was asked to check the absolute vapour pressure data for the text in square brackets in 6.7.2.1 (i) and the type (IP 56) to be referred to in 6.7.2.5.15.

(c) New provisions for the transport of solid substances in bulk in freight containers

Document: ST/SG/AC.10/C.3/1999/92 (Germany)

24. A large number of delegations welcomed the work carried out by the expert from Germany which provided a good basis for the work of preparing the new provisions.

25. In view of the numerous detailed comments, the expert from Germany offered to organize an inter-sessional working group on the question.

26. Several delegations considered that certain substantive issues should be dealt with first, namely:

- specification of the substances to be authorized for carriage in freight containers;
- determination of whether there was a need to prescribe specific provisions for the construction, tests and certification of containers intended for the carriage of solid dangerous goods in bulk, in view of the fact that such carriage was already authorized for certain substances in containers meeting the specifications of ISO and UIC standards and the provisions of the Convention on Safe Containers (CSC); if necessary, provision to be made for a link with CSC;
- scheduling of cooperation with the International Atomic Energy Agency (IAEA) for radioactive material;
- definition of the notion of carriage in bulk in view of the different interpretations of this term in inland transport overland and in maritime transport.

27. Although some delegations admitted that the carriage in bulk of dangerous solid substances in bulk in vehicles or freight containers could be justified under specific regional conditions, they considered that the large-scale international transport of such substances, particularly in open freight containers, should be restricted to a few special cases since carriage in bulk in tanks offered much better guarantees of safety.

TRANSPORT OF DANGEROUS GOODS DOCUMENTATION

Documents: ST/SG/AC.10/C.3/1998/20 (United Kingdom)
ST/SG/AC.10/C.3/1999/58 and -/Add.1 (United States of America)
ST/SG/AC.10/C.3/1999/67 (UIC)
ST/SG/AC.10/C.3/1999/69 (CEPE)
ST/SG/AC.10/C.3/1999/91 (Netherlands)

Informal documents: INF.5 (CEPE)
INF.16 (United States of America)

28. The Sub-Committee welcomed the work carried out in particular by CEPE and the United States of America on the revision of Chapter 5.4 of the Model Regulations.

29. The question had arisen as to whether an in-depth revision of this chapter should be made during the current biennium or a revision with a view to harmonizing the various existing modal regulations.

30. The expert from the United Kingdom expressed the hope that an in-depth revision would be made, in accordance with his document ST/SG/AC.10/C.3/1998/20, following an analysis of the real utility of the present requirements, bearing in mind the imperatives of safety. The work done by CEPE was a useful starting point. These documents, however, should rather be studied by an informal working group which FIATA had proposed to convene.

31. The expert from the United States of America considered that the present requirements stemmed from well-justified safety imperatives and that there was no need to call them into question again without detailed justification on the sole basis of surveys of transport document users concerning their utility. He preferred a revision of the wording so as to harmonize the various requirements of current modal regulations, as proposed in his document.

32. It was, however, pointed out that the proposal by the United States of America introduced a large number of new requirements which did not exist in the current international regulations, such as, for example, that of an emergency telephone number in the transport document.

33. The expert from the United States said that the new requirements on emergency response in his document could be the subject of separate proposals. The Sub-Committee therefore made an informal drafting group, which met between meetings, responsible for considering the proposal for Chapter 5.4 prepared by the United States of America.

34. The representative of CEFIC expressed disappointment at the procedure adopted since he would like an in-depth revision of this chapter in order to make possible an international multimodal transport operation in which the particulars to be included in the transport document would be the same whatever transport mode was used or whatever the country through which the transport passed.

35. With reference to the sequence of information to be included in the transport document (ST/SG/AC.10/C.3/1999/67, -/C.3/1999/91 and INF.16), a matter of frequent debate between those in favour of information beginning with the official shipping name as currently prescribed in the Model Regulations, the IMDG Code and the ICAO Technical Instructions, and those in favour of putting the UN number first (as in ADR and RID) since it was more easily comprehensible in international transport operations between countries using different languages, opinions remained very divided. After a close vote, it was decided to keep to the currently prescribed sequence.

36. The expert from Belgium said that the present problems of consignors derived from the fact that different sequences were prescribed. In his opinion, the sequence was not of great importance since the important facts were grouped together in any case; he would prepare a proposal removing the requirement of a given sequence, and this should solve the practical problems.

37. The proposal by UIC concerning the specification of the subsidiary risk for Class 2 in document ST/SG/AC.10/C.3/1999/67 received no support and was withdrawn.

Informal document: INF.48 (Report of the drafting group on documentation)

38. The Sub-Committee agreed that the text developed by the drafting group should be annexed to the report for further consideration at the next session (see annex 3).

MISCELLANEOUS DRAFT AMENDMENTS TO THE MODEL REGULATIONS ON THE TRANSPORT OF DANGEROUS GOODS

Listing and classification

Solvent-free acetylene

Document: ST/SG/AC.10/C.3/1999/30/Rev.1 (Germany)

39. The proposed new entry for solvent-free acetylene was adopted subject to the inclusion of appropriate packing requirements in packing instruction P200 by the working group on gas cylinders and multiple element gas containers (MEGCs) (see annex 1, para. 19 and annex 2).

Cargo transport unit under fumigation

Document: ST/SG/AC.10/C.3/1999/52 (Belgium)

40. Following discussions at the previous session (see ST/SG/AC.10/C.3/32, paras. 40-41 and Addendum 2), it was decided to amend the English version of the proper shipping name of UN No. 3359 ("fumigated unit") and add a special provision (see annex 2). The French name would remain unchanged.

Ammonium nitrate entries

Document: ST/SG/AC.10/C.3/1999/59 (Canada, United States of America and EFMA)

Informal documents: ST/SG/AC.10/C.3/1999/59/Corr.1 (United States of America)
INF.4 (EFMA)

41. The Sub-Committee agreed that the number of entries for ammonium nitrate and ammonium nitrate fertilizer could be cut back (see also ST/SG/AC.10/C.3/32, para.56), and more particularly that entries UN Nos. 2067, 2068, 2069 and 2070 should be replaced by a single entry, which would be numbered UN No. 2067, since this was the entry currently most used.

42. The Sub-Committee also decided to delete entry UN No. 0223 since mixtures of this description were not used as fertilizers.

43. The expert from Belgium opposed the deletion of n.o.s. entry 2072 (Division 5.1), since this entry had special segregation requirements in the IMDG Code.

44. The representative of EFMA and the expert from Germany said that, in view of the applicable procedures and standards for their manufacture, ammonium nitrate fertilizers with more than 0.4% combustible substances were not produced. It was therefore decided that entry 2072 should also be deleted.

45. The Sub-Committee further agreed that the contents of special provision BBB, amended in accordance with informal document INF.4, should be transferred to special provision CCC which applied to the new entry 2067.

46. Opinion was divided, however, regarding special provision AAA, since some experts considered that series 1 and 2 tests were not appropriate for ammonium nitrate fertilizers.

47. It was also proposed that the descriptive text of entry 0222 should be replaced by the phrase "exhibiting explosive properties", without reference to its composition. Some experts considered, however, that the reference to the composition made it possible to avoid testing and was therefore more practical.

48. The provisionally agreed changes are shown in annex 4. The Sub-Committee invited the authors of the proposal to submit proposals on outstanding issues.

Hydrazine hydrate and hydrazine, aqueous solution

Document: ST/SG/AC.10/C.3/1999/74 (Canada)

49. The Sub-Committee maintained the decision taken at the last session to make provision for three packing groups. In order to solve the problem raised by the expert from Canada, it was decided to delete "HYDRAZINE HYDRATE, or" in the description and to include the name of the substance in lower case in the index, in a reference to aqueous solutions of hydrazine (see annex 2).

Generic chlorosilane entries

Document: ST/SG/AC.10/C.3/1999/75 (Canada)

50. The expert from Canada withdrew the proposal.

51. The representative of CEFIC expressed regret at this decision since he considered that the two entries 3361 and 3362 adopted at the previous session raised a real problem (see ST/SG/AC.10/C.3/32, paras. 47-51). He said that he would submit a proposal at the next session.

Desensitized explosives

Documents: ST/SG/AC.10/C.3/1999/80 (United Kingdom)
ST/SG/AC.10/C.3/1999/85 (United States of America)

52. The Sub-Committee agreed that it would be advisable to revise the entries for desensitized explosives.

53. Several experts supported the second solution put forward by the United Kingdom, which was to create new entries to cover cases in which special provisions 15 and 18 were currently applied.

54. The expert from the United States of America said that he had no wish to increase the number of entries, particularly as he was not sure that all the substances were still being produced or carried in large quantities, something that should be checked. He noted, however, that substances could not be carried under n.o.s. entries and that UN numbers were therefore necessary if they were actually carried.

55. With reference to paragraph 3 (a) of document ST/SG/AC.10/C.3/1999/85, the expert from Norway said that the three substances covered by UN Nos. 2555, 2556 and 2557 were solids and not liquids.

56. Following the discussion, the expert from the United Kingdom said that he would prepare a new document for the next session which would include all the amendments to be made.

Transport of materials capable of undergoing uncontrolled polymerization (stabilization by means of temperature control)

Document: ST/SG/AC.10/C.3/1999/81 (United Kingdom)

57. The Sub-Committee adopted in principle the proposal by the United Kingdom to ensure that the proper requirements were applied when substances which should be carried in "stabilized" form were stabilized by maintaining their temperature below 55 °C during carriage.

58. Several experts said that the special provisions proposed would not always be necessary since some of the substances listed were never carried under temperature-controlled conditions. They would therefore prefer to transfer these provisions to the general section.

59. The expert from the United Kingdom proposed to rearrange the texts to take the comments into account. For the texts adopted see annex 2.

Pressure test for lighters and lighter refills

Documents: ST/SG/AC.10/C.3/1999/86 and -/Add.1 (China)

Informal documents: INF.8 (United Kingdom for the European Federation of Lighter Manufacturers)
INF.33 (China)

60. The Sub-Committee agreed by consensus that a pressure test should be required for lighters and lighter refills. It noted, however, that the standard ISO 9994:1995 already existed on safety specifications for lighters, including, inter alia, an internal pressure test similar to that proposed by China but with different criteria.

61. The expert from China was asked to prepare a new proposal which would contain amendments to special provision 201 and Chapter 6.2 in order to prescribe an internal pressure test in keeping with the ISO standard, and possibly also the other tests covered by this standard if it was considered necessary.

62. The expert from China accepted the Sub-Committee's request.

Amendment of special provision 216

Document: ST/SG/AC.10/C.3/1999/89 (United States of America)

63. The proposed amendment to special provision 216 was adopted with slight modifications (see annex 2).

Airbag inflators

Document: ST/SG/AC.10/C.3/1999/94 (Germany)

64. The expert from Germany requested the postponement of the discussion on this document until the next session.

Lithium batteries

Document: ST/SG/AC.10/C.3/1999/73 (Canada/Japan)

Informal documents: INF.7 (Canada/Japan)
INF.20 and INF.21 (France)

65. A small informal group met to discuss document ST/SG/AC.10/C.3/1999/73 prepared by the correspondence group established at the previous session (see ST/SG/AC.10/C.3/32, para. 58). The informal group concluded that additional work was required and, noting that work by correspondence was less efficient than in a working group, it expressed a wish for an informal working group to meet to prepare a new document for the next session.

66. The expert from the United States of America said that he saw no need for such rapid amendment of the requirements adopted at the last session of the Committee, and wondered whether the work could not be spread over the next biennium, so as to avoid having to convene an informal group to complete the work in 2000. The expert from Canada shared this point of view.

67. The expert from France on the contrary considered that it was important to complete as soon as possible the work contained in the mandate given to the correspondence group at the previous session. The lithium batteries industry was in full expansion and numerous research programmes had been undertaken, in particular for the use of such batteries in electric cars; the trend of these programmes depended heavily on the decisions to be taken by the Committee.

68. The Chairman said that it was for the correspondence group to organize its work as it thought fit, provided that if it submitted a document for the next session it did so in accordance with the mandate it had been given at the last session.

Organic peroxides/Self-reactive substances

Informal document: INF.3 (Finland/CEFIC)

69. The Sub-Committee noted that a proposal concerning transport of peroxyacetic acid, 41% with water, in tanks would be submitted to the next session.

Chapter 3.4 (Limited quantities)

Documents: ST/SG/AC.10/C.3/1999/56 (Australia)
ST/SG/AC.10/C.3/1999/65 (Belgium)
ST/SG/AC.10/C.3/1999/84 (United Kingdom)

Informal documents: INF.11 (United Kingdom)
INF.19 (Belgium)

70. The experts from Belgium and the Netherlands said that there was no need to endeavour systematically to harmonize modal requirements for the transport of dangerous goods packed in limited quantities since the nature of transport operations varied according to the mode of transport, e.g. carriage by container in full loads in maritime transport as opposed to transport for distribution on land.

71. Most of the experts did not share this opinion and considered that the Sub-Committee should endeavour to harmonize existing requirements so that the Model Regulations would contain requirements acceptable to all transport modes.

72. In ST/SG/AC.10/C.3/1999/56, the expert from Australia proposed to increase the hazard communication elements contained in outer package marking and to limit the total quantity of "limited quantities" of dangerous goods on transport units allowed before placarding and documentation would be required. After general discussion, in which some support was expressed by some delegations, the expert from Australia offered to bring a simpler proposal to the next Sub-Committee session taking into account comments made by the experts.

73. After a general discussion based on document ST/SG/AC.10/C.3/1999/56, submitted by Australia, the Sub-Committee preferred to take a decision on the proposals contained in document ST/SG/AC.10/C.3/1999/84 submitted by the United Kingdom which seemed closer to the various modal requirements currently in force, and simpler.

74. For the marking of packages, the Sub-Committee decided that, on the basis of the proposals by the expert from Belgium in ST/SG/AC.10/C.3/1999/65 and INF.19, the UN number(s) of the substances contained in them should be marked on the package within a diamond, which was preferred (following a vote) to a rectangle.

75. A verbal proposal by the expert from Germany to put the letters "LQ" inside the diamond instead of the UN numbers when there were several substances was rejected.

76. The Sub-Committee also confirmed, following a vote, that all the UN numbers must be included.

77. The proposal for a section 3.4.9 concerning the carriage of consumer commodities was tantamount to making the present provisions of paragraph 3.4.8 more restrictive, and took its inspiration from the ICAO Technical Instructions (special identification number in Class 9).

78. Several experts considered that the consumer commodities in question were neither more nor less than dangerous goods packed in limited quantities. They feared that industry might take advantage of the duplication of provisions to select the least stringent among them, i.e. those of section 3.4.9. They could not see any advantage in terms of safety in the Class 9 label and the special UN number since they contributed no information to the emergency services regarding the nature of the danger.

79. Other experts noted that the present provisions of paragraph 3.4.8 exempted such packages from labelling and the marking of the UN number, and from the transport document; these derogations were particularly useful for express consignments of current consumer commodities, such as perfumes, where consignors had difficulty in meeting the requirements for the UN number and finding the pertinent label. The requirement of a Class 9 label with a single UN number covering all these products was more restrictive than the present provisions but was easily applied in this type of consignment.

80. After a lengthy discussion, the section 3.4.9 proposal was not kept. The question was then raised as to whether present section 3.4.8 was to be deleted, as appeared logical to a number of experts in view of the discussion and the decision on section 3.4.9. It was decided, however, to keep the present section 3.4.8 as it stood since the aim of the United Kingdom's proposal was not to delete it.

Document: ST/SG/AC.10/C.3/1999/60 and -/Corr.1 (United States of America)

81. The proposal to extend the provisions of Chapter 3.4 to certain substances of Class 3, Packing group I, was adopted, except in the case of UN No. 1993 (see annex 2).

82. All the other proposals to harmonize the various modal requirements for the application of Chapter 3.4 to substances of Class 3 (Packing group II), Division 4.1, Division 5.1, Division 6.1 and Class 8 (Packing groups II and III) and Class 9 (Packing group III) were adopted (see annex 2).

83. For Class 9, Packing group II, some experts considered that the provisions of Chapter 3.4 could not be used in practice because of the nature of the product (e.g. castor beans) or were not advisable (e.g. PCBs or asbestos).

84. After consideration on a case-by-case basis, the Sub-Committee agreed to apply limits of 1 kg and 1 l for these substances, except for castor beans (UN 2969) (5 kg) and UN Nos. 2990, 3072, 3090 and 3091 for which such provisions were not necessary (see annex 2) .

Document: ST/SG/AC.10/C.3/1999/63 (United States of America)

85. The Sub-Committee adopted this proposal concerning the application of Chapter 3.4 to chemical kits (see annex 2).

Packagings

Periodic tests for IBCs

Document: ST/SG/AC.10/C.3/1999/3 (Argentina)

Informal document: INF.32 (Argentina)

86. The Sub-Committee took note of the communication submitted by the expert from Argentina concerning deadlines for the periodic testing of IBCs and if possible consequences for the transport of hazardous waste under the Basel Convention.

Drafting changes to Chapter 6.5

Document: ST/SG/AC.10/C.3/1999/33/Rev.1 (ICIBCA)

87. After consideration by a drafting group, the Sub-Committee adopted a number of drafting changes to Chapter 6.5 (see annex 2).

Salvage packagings

Document: ST/SG/AC.10/C.3/1999/51 (HMAC)

88. Some experts feared that allowing the use of salvage packagings for the carriage of packages the packaging of which did not conform to requirements would lead to misuse.

89. Other experts pointed out that in view of the cost of such packagings, there was no reason to fear misuse. The use of salvage packagings in any case was sometimes the only solution for the completely safe transport of older packages of dangerous products such as pesticides, when the packaging, even when it was in good condition, did not comply with the requirements in force.

90. A proposal by Belgium requiring that in such cases carriage should only be permitted to the nearest centre where disposal or recovery is possible was not adopted.

91. The proposal by HMAC was adopted as it stood (see annex 2).

IBCs for substances liable to become liquid during transport

Document: ST/SG/AC.10/C.3/1999/53 (Belgium)

92. The proposal to add to the list of IBCs which were not to be used for substances liable to become liquid during transport was adopted (see annex 2).

Transport of ammonia solution in IBCs

Document: ST/SG/AC.10/C.3/1999/55 (Norway and Sweden)

93. Although the proposal by ICIBCA not to impose vapour pressure limits on the use of IBCs for the carriage of liquids had not been adopted at the previous session (see ST/SG/AC.10/C.3/32, para. 78), the experts from Norway and Sweden requested a derogation for the transport of ammonia solutions in concentrations of 25% or less in rigid or composite plastics IBCs (31H1, 31H2 and 31HZ1), in view of the fact that such transport had been authorized in their countries for many years without causing any incidents. Should the prohibition be kept in the Model Regulations, the practice would have to stop, to the detriment of their industry, since it would no longer be justifiable in the current European legal context.

94. Opinions were divided on the issue, but the Sub-Committee finally adopted the proposal (see annex 2).

Reprocessing of intermediate bulk containers (IBCs)

Documents: ST/SG/AC.10/C.3/1999/87 (ICPP)
ST/SG/AC.10/C.3/1999/95 (ICIBCA)

Informal document: INF.9 (ICPP)

95. The Sub-Committee noted that CEFIC, ICCR, ICIBCA, ICPP and ICDM would meet in Brussels (Belgium) in January 2000 to discuss the question of the maintenance of IBCs on the basis of these documents and that they would submit a new proposal on behalf of the industry at the next session. The meeting would be opened to other participants.

96. The expert from the United Kingdom suggested that when studying the question of the maintenance of IBCs, this group should bear in mind the current repair and servicing provisions and the need for the IBC and all component parts to continue to meet the specifications for which the design type had been tested.

Vibration tests for steel drums 1A1, 1A2, 1B1, 1B2, 1N1 and 1N2

Document: ST/SG/AC.10/C.3/1999/71 (Spain)

97. The representative of SEFEL said that the proposal by Spain for the inclusion of an additional vibration test should have been accompanied by accident statistics showing that this test was necessary.

98. Several experts shared this viewpoint, recalling that vibration tests were costly and difficult to put into practice and therefore difficult to apply in many countries, and that the Sub-Committee had so far considered that the vibration test was unnecessary.

99. Other experts considered, however, that since a requirement existed to the effect that packagings should be resistant to vibrations caused during carriage, this should be demonstrated by an appropriate test.

100. Following a majority vote, the Sub-Committee decided that, in principle, at some time in the future, a vibration test should be included in the Model Regulations, on the understanding that the forms the test would take and the criteria for it were still to be defined and should take account of pertinent ISO standards and existing vibration test standards. The expert from Spain would work on the vibration test with the cooperation of other countries, coordinating their work.

Minimum wall thickness of steel drums

Document: ST/SG/AC.10/C.3/1999/72 (Spain)

Informal documents: INF.6 (ICDM)

101. The expert from Spain said that he had received numerous comments on his proposal and that he would like more time to study them. He withdrew his document and would submit a new proposal at the next session after having discussed these comments with the manufacturers.

Packing instructions P601, P401 and P402

Document: ST/SG/AC.10/C.3/1999/78 (France)

Informal document: INF.28 (France)

102. The expert from France took note of the comments by the other delegations, as follows:

P601: The periodic test pressure was considered unrealistic; the visual inspection would not be necessary either as the consignor would have anyway to check the good condition of the packaging each time before use;

P401 and P402: Certain experts approved the principle of the proposal; however, additional time was deemed necessary to study all its consequences.

103. He said that he would submit a new proposal at the next session.

Unpackaged articles

Document: ST/SG/AC.10/C.3/1999/79 (United Kingdom)

104. The Sub-Committee agreed to introduce a new section 4.1.3.8 for unpackaged articles of classes other than Class 1 on the basis of the proposal by the United Kingdom (see annex 2).

Marking of the date of manufacture on IBCs, large packagings and portable tanks

Document: ST/SG/AC.10/C.3/1999/98 (South Africa)

Informal document: INF.29 (Argentina)

105. The proposal by South Africa to replace the present marking requirements (the month followed by the year) by marking in accordance with ISO standards (year, month, day) was not adopted since the present system was well established.

106. The proposal by Argentina to mark the last three figures of the year instead of two after the year 2000 was not considered to be necessary, since no problems were envisaged in this context with the transition to the year 2000.

Top lift test for flexible large packagings

Documents: ST/SG/AC.10/C.3/1999/90 and -/Add.1 (China)

107. The proposal by China was adopted (see annex 2).

Packing instruction P002, special provision PP11

Informal document: INF.13 (United Kingdom)

108. The proposed amendment was adopted (see annex 2). The question of the application of special provision PP11 to UN No. 1309 was not discussed.

Infectious substances

Classification and packaging of diagnostic specimens

Document: ST/SG/AC.10/C.3/1999/83 (United Kingdom and Germany)

109. The Sub-Committee adopted the principle of the approach presented in this proposal, namely, a UN number and a packing instruction for diagnostic specimens. The experts from Germany and the United Kingdom were asked to submit a new proposal, taking into account the comments made.

Miscellaneous

Definition of the term "liquid"

Document: ST/SG/AC.10/C.3/1999/54 (Belgium)

110. This proposal was adopted (see annex 2).

Labelling of LPG cylinders and gas cartridges

Document: ST/SG/AC.10/C.3/1999/70 (AEGPL)

111. The proposal permitting the use of the contrasting background colour of cylinders and cartridges (instead of black or white) on the red labels of model No. 2.1 was adopted for this particular case of LPGs, for practical reasons relating to the use of such cylinders (see annex 2).

GLOBAL HARMONIZATION OF SYSTEMS OF CLASSIFICATION AND LABELLING OF CHEMICALS

General

Informal documents : INF.24 and INF.26 (Chairman)
INF.50 and INF.51 (ILO)

112. The representative of ILO presented a progress report on the work on the global harmonization of systems of classification and labelling of chemicals (INF.50).

113. The Sub-Committee was also informed of the outcome of the ILO Working Group on Hazard Communication held in Washington, United States of America, from 1 to 4 November 1999 (INF.24).

114. Detailed information on various GHS issues may be obtained from the ILO website "http://www.ilo.org/private/protection/safework/ghs/" and on the OECD website "http://www.oecd/org/ehs/classify".

115. The Sub-Committee noted that during the next session of the ILO Working Group, a step 2 document (i.e. a proposal containing different options for harmonization) would be discussed. Several experts noted that, apart from the Chairman of the Committee and the secretariat, very few transport experts participate in the ILO Working Group sessions. They recommended that the transport sector should be better represented at the next session.

116. The expert from the United Kingdom said that he felt unconfortable with that suggestion as he considered that the Government representatives of the 12 countries participating in that work should express nationally coordinated positions and not sectoral interests. Furthermore, he felt that the possible options to be discussed would be rather broad and, as there were many difficulties to overcome, the outcome of this work would be fairly limited.

117. For hazard communication related to emergency response, it was recalled that there is no harmonized system of emergency response in the transport sector, although there is a harmonized system of hazard communication for emergency response purposes. It was felt that if transport emergency response issues were raised, including with respect to hazard communication, they should be directed to this Sub-Committee, especially proposals specifically intended to modify the existing system of hazard communication during transport.

118. The expert from Germany added that the application of hazard communication provisions currently intended for transport emergency response to other sectors like storage should be encouraged.

119. The Sub-Committee also noted the outcome of the 15th consultation of the IOMC Coordinating Group for the Harmonization of Chemical Classification Systems (Washington, 5 November 1999), in particular that the Coordinating Group had decided to continue working in 2001 when the Sub-Committee of Experts on the Globally Harmonized System of Classification and Labelling of Chemical (GHS Sub-Committee) should start working in accordance with resolution 1999/65, because it could not be expected that a globally harmonized system could be completed by the end of 2000.

120. Certain experts felt that duplication of work should be avoided and that there should not be two bodies dealing with the same issues. On the other hand, it was noted that the two first sessions of the new GHS Sub-Committee would probably be dedicated to organizational issues, and that it would be difficult to concentrate the ten meeting days allocated to the new Sub-Committee on GHS in a biennium in the second year (2002) as this would mean that there would be only five meeting days left to the Sub-Committee of Experts on the Transport of Dangerous Goods in that second year of the biennium which is traditionally much busier than the first year.

121. It was recalled that the agreement for the new arrangements was that the existing schedule of meetings should remain unchanged and that sessions of the various bodies should be held back to back every six months, that the total number of meeting days allocated to the reconfigured Committee session should not exceed three days per biennium while the number of meeting days that could be allocated to the new GHS Sub-Committee would have to be agreed by the Committee of Experts at its twenty-first session in December 2000 and should normally be a total of 8 to 10 days for the four sessions (i.e. 2 to 3 days per session) (ST/SG/AC.10/25, para. 114 (5)). Therefore, if the Sub-Committee on GHS did not use the meeting time allocated to it, this meeting time could be used by the Sub-Committee of Experts on the Transport of Dangerous Goods if needed, otherwise it would be lost.

122. The expert from the United Kingdom did not agree with this interpretation. He felt that there would be no duplication of work since the mandate for the GHS Sub-Committee was different from that of the IOMC Coordinating Group. Meeting times had been fixed for the biennium 2001-2002 by Resolution 1999/65 and it was not in the hands of the existing Committee of Experts on the Transport of Dangerous Goods to change that.

123. The observer from Austria said that he understood that certain functions of the existing Sub-Committee of Experts on the Transport of Dangerous Goods would be taken over by the new Sub-Committee on GHS, namely those related to listing and classification which is a standing item on the agenda of the Sub-Committee, and he expressed the wish that the role of the new Sub-Committee on GHS be clarified in that respect. It was agreed that the respective mandates of the two Sub-Committees were already clear in that respect and that whilst the Sub-Committee of Experts on GHS would set criteria, the Sub-Committee of Experts on the Transport of Dangerous Goods would determine application for transport.

Health hazards and hazards to the environment

Informal document : INF.25 (Chairman)

124. The Sub-Committee took note of the information provided by the Chairman on the work of OECD on the classification of mixtures, supplemented by explanations by the representative of OECD.

125. The Sub-Committee noted with satisfaction that reference was made to calculation methods recommended in the UN Recommendations on the Transport of Dangerous Goods. However, certain steps in the classification procedure seemed to be rather complicated and might not allow self-classification.

126. The representative of OECD said that the OECD proposal for classification of mixtures took account of all existing systems, and that certain existing systems - in particular the European Union system for classification of mixtures - were not as simple and straightforward as the UN system. He confirmed nevertheless that the mandate of the OECD group on classification of mixtures included the objective that the system should be as simple as possible and should allow self-classification. He also said that the classification methods being developed for the GHS were intended to limit testing to the extent possible, but that both testing and calculation methods would be provided for.

Documents: ST/SG/AC.10/C.3/1999/27 (United Kingdom)
ST/SG/AC.10/C.3/1999/67 (Belgium)
ST/SG/AC.10/C.3/R.707 (Argentina)

Informal documents : INF.31 and INF.38 (Argentina)
INF.42 (Germany)

127. Certain experts felt that it would not be appropriate to include provisions concerning classification of environmentally hazardous substances in the UN Model Regulations as long as the work of OECD for classification of mixtures had not been completed.

128. It was noted that the flow chart proposed in the documents did not correspond exactly to the criteria agreed by OECD, and that corrections would be necessary.

129. The representative of OECD said that it should be made clear that the title of Chapter 2.9 or the definition of substances which were dangerous to the environment by reason of aquatic pollution relate only to danger during transport, as the criteria developed by OECD were broader and would encompass situations other than transport.

130. Several delegations said that they considered that it would not be appropriate to develop provisions for the transport of environmentally hazardous substances only on the basis of criteria, because this would mean that any kind of substance, not presently subject to transport of dangerous goods regulations, would have to be tested for their potentially polluting properties. Therefore they preferred to restrict requirements applicable to aquatic pollutants to a list of substances which have been specifically identified as pollutants in accordance with the criteria.

131. Several experts opposed the United States' view raised at the previous session, reflected in the OECD proposal, that a distinction should be made between carriage in packagings/IBCs and carriage in tank-containers. They could agree that carriage in tank-vessels represented a special case, but for example under Annex III of the MARPOL Convention, all substances, whether carried in packagings or in tank-containers were treated the same.

132. Although the UN Recommendations (para. 10) stated clearly that many dangerous goods listed in Classes 1 to 9 are deemed, without additional labelling, as being environmentally hazardous, certain experts considered that the danger to the environment should be clearly identified in all classes, as relevant, as in the IMDG Code, because this was important in particular for stowage purposes in the case of maritime transport and emergency response purposes.

133. The observer from the Bahamas expressed concern at the fact that provisions for substances hazardous to the environment had been lacking in the UN Model Regulations for many years, although such provisions existed in maritime and inland transport regulations. He regretted that the adoption of such provisions had been repeatedly postponed pending adoption of globally harmonized criteria, which were not likely to be definitively available that soon. Substantial proposals prepared by experts and working groups in the past years were still pending because of this situation, and as a consequence there was no clear signal to the industry with respect to the regulatory direction. Therefore, he proposed to adopt at least a basic text to be annexed to the report for future inclusion in the Model Regulations, to stimulate the regulatory process, even if that text had to be modified in the next biennium.

134. The view of the observer from the Bahamas was largely shared by the experts of the Sub-Committee, and it was agreed to adopt a text based on the United Kingdom proposal ST/SG/AC.10/C.3/1999/27, placing the flow chart in square brackets and taking account of the Belgian editorial comments in the proposal ST/SG/AC.10/C.3/1999/67.

Physical hazards

Flammability of aerosols

135. This sub-item was discussed by the joint ILO/UN Working Group on the Harmonization of the Classification Criteria for Physical Hazards (see annex 5).

136. The representative of FEA said that FEA and CSMA would prepare three harmonized tests for classification of aerosols for inclusion in the Manual of Tests and Criteria. FEA will also present a set of test data to support their proposal for classification of aerosols as flammable or non-flammable.

Document : ST/SG/AC.10/C.3/1999/64 (Norway)

137. It was agreed that, according to discussions held during the UN/ILO Working Group session, changes to the criteria for flammability in special provision 63 would be necessary, but that these changes should be considered only at the next session when new proposals would be available.

Document : ST/SG/AC.10/C.3/1999/82 (United Kingdom)

138. There were divergent views as to whether aerosols containing non toxic propellant gas but toxic components should be considered as Division 2.3 aerosols or Division 2.2 aerosols with Division 6.1 subsidiary risk, but the Sub-Committee agreed to adopt the United Kingdom proposal based on the existing ICAO Technical Instructions (see annex 2).

OTHER BUSINESS

Application for consultative status by the Standing Committee of European Doctors (CP)

Informal document: INF.34

139. The Sub-Committee unanimously accepted the participation of CP in its work.

Establishment of the ISO/TC220 Technical Committee - Cryogenic vessels

Informal documents: INF.35 and INF.49 (ISO)

140. The Sub-Committee took note of the establishment of this new technical committee and confirmed its interest in an official link with TC220.

Seventeenth session of the ICAO Dangerous Goods Panel

Informal document: INF.40 (ICAO)

141. The Sub-Committee noted that the next edition of the ICAO Technical Instructions would be applicable on 1 January 2001 and that there was a problem of harmonization among the various transport modes between 1 January 2001 and the end of 2002 since the IMDG Code provided for transitional measures up to 31 December 2001, while the corresponding new provisions of RID/ADR would only enter into force on 1 July 2001 at earliest with a transitional period scheduled up to 31 December 2002.

Miscellaneous

Informal documents : INF.44, INF.45 and INF.46 (China)

142. As these informal documents related to new proposals, the secretariat was requested to issue them as official documents for the next session.

TRIBUTE TO MR. ALAN ROBERTS

143. The Sub-Committee was informed that Mr. A. Roberts, Chairman of the Committee from 1980 to 1988, would be retiring soon, after a 43-year career with the Government of the United States of America. Experts were invited to a reception organized by the Expert from the United States of America where they could express their appreciation of Mr. Robert's contribution to the work on the transport of dangerous goods over so many years and wished him a long and happy retirement.

PROGRAMME OF WORK

144. The Sub-Committee agreed that, for the next session, the working group on gas cylinders and MEGCs should be reconvened during the first week (3-7 July 2000). A working group on Class 1 emulsions should be convened on the first day of the second week (10 July 2000). One day would be needed for the UN/ILO Working Group on Physical Hazards (aerosols), and the whole Sub-Committee session would be held during two full weeks (3-14 July 2000).

145. The deadline for submission of documents is 14 April 2000.

ADOPTION OF THE REPORT

146. The following documents remain on the agenda for the next session:

ST/SG/AC.10/1998/5;
ST/SG/AC.10/1998/6

ST/SG/AC.10/C.3/1999/58 and -/Add.1
ST/SG/AC.10/C.3/1999/69
ST/SG/AC.10/C.3/1999/73
ST/SG/AC.10/C.3/1999/94

147. The Sub-Committee adopted the report on its seventeenth session and the annexes thereto.

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Annex 1

Report of the Working Group on Gas Receptacles and Multiple-Element Gas Containers (MEGCs)

General

1. The Working Group on Gas Receptacles and MEGC's met from 6 December to 9 December 1999 under the chairmanship of Mr. H. Puype (EIGA). Representatives of Australia, Canada, France, Germany, the United Kingdom, the United States of America, the European Liquefied Petroleum Gas Association (AEGPL), the Compressed Gas Association (CGA), the European Cylinder Makers Association (ECMA), the European Industrial Gases Association (EIGA) and the International Organization for Standardization (ISO) participated in the meeting.

2. The objective of the Working Group was to have a reading of document ST/SG/AC.10/C.3/32/Add.1 that presented the outcome of the discussions held during the first meeting of the Working Group taking into account informal documents INF.10 (United Kingdom), INF.14 (ISO), INF.17 (United States of America) and INF. Paper (no number) from AEGPL. The outcome of the discussions is reflected in more detail in the proposals 1 to 7 below. The consolidated list of proposed amendments to the Model Regulations is reproduced in ST/SG/AC.10/C.3/34/Add.1.

3. Due note was taken of the reconfirmation of the remit of the Working Group given by the plenary meeting:

(a) The ISO standards represent one way to comply with the requirements;

(b) Other standards can be incorporated.

Proposal 1: Inclusion of additional definitions in Part 1

4. Minor editorial changes have been agreed and incorporated in order to align with the definitions in ISO 10286 "gas cylinders - terminology".

5. The group confirmed the use of the term "pressure drum".

6. The group agreed to limit the capacity of bundles intended for the transport of division 2.3 gases to 1000 litres.

7. The expert from France will supply the experts from the United States of America and Canada and the representative of CGA with the pressure drum standard in preparation by the European Standardization Committee (CEN).

8. The reference to ISO for dimensions and corner fittings was deleted.

Proposal 2: Definitions and general provisions in Part 2

9. The Working Group confirmed that the definitions affect 4 gases only, namely 1982 tetrafluoromethane, compressed; 2451 nitrogen trifluoride, compressed; 1859 silicon tetrafluoride, compressed and 1008 boron trifluoride, compressed, where the proper shipping names will lose the qualification "compressed".

10. The group decides to maintain the phrase "gases with an LC_{50} lower than or equal to 200 ppm" and to drop the proposal for a definition of "highly toxic gases".

Proposal 3: Special packing provisions for dangerous goods of Class 2 in Chapter 4.1

11. The group decided to add a reference to ISO 11114-1 and ISO 11114-2 in 4.1.6.1.1 for the purpose of selecting materials of pressure receptacles and their closures.

12. The group addressed the issue of pressure receptacles having contained corrosive liquids and changed to gas service.

13. The requirements of ISO 11117: 1998 related to valve protection by caps, shrouds or guards were made compulsory.

14. The requirements of the appendix of ISO 10297 were proposed for consideration for the testing of unprotected valves.

15. The group reworded the restrictions on transport and filling. It was agreed that the restriction for pressure receptacles beyond their prescribed inspection periods should apply to filling only.

16. The issue of the use of pressure-relief devices (PRD) will be dealt with after the examination of the risk assessments and statistical data. The expert from the United States of America will review all available statistical data and risk analyses before making a recommendation. AEGPL, CGA and EIGA will provide available statistical data and risk analyses and submit their positions. There was already agreement on a prohibition for toxic gases with an LC_{50} lower than 200, and mandatory with bursting disc for CO2 and N2O. If PRD are mandatory the requirements shall include the type and the sizing of the PRD's. The expert from the United States of America indicated that, when PRD's are used to protect pressure receptacles in a fire, performance tests should be specified. CGA offered publications for consideration (C14, C12 and S-1.1). The expert from France pointed out that the fitting of PRD's for CO2 and N2O are for overfilling protection and do not need any sizing.

17. The formulae in P200 for the determination of the filling ratios were accepted.

18. The request from the United Kingdom to incorporate climatic zones was not retained; the provisions in the UN Model Regulations for multimodal transport do not prevent modal regulations from adopting less stringent temperature criteria.

19. The group noted the request from the Sub-Committee to include a new position for acetylene undissolved. Germany will provide a special provision in accordance with their proposal ST/SG/AC.10/C.3/1999/30/Rev.1.

20. Acetylene cylinders with non-monolithic masses have not been retained for UN certified pressure receptacles.

21. The group agreed to add special provision "m" to butane, propane, isobutane. The expert from Germany will provide, for consideration at the next meeting the conditions that German authorities require to approve the 15 years inspection and testing period for LPG cylinders in order to lift the brackets.

22. Special provision "n" which applies to toxic gases with a LC_{50} lower than 200 ppm has been put between brackets. The expert from France will provide a table with minimum wall thicknesses for different materials as required in the ISO standards for construction, for the group to decide at next meeting if note "n" could become redundant.

23. Special provision "o" related to hydrogen embrittlement has been allocated to the list of gases in the table in accordance with the provisions of ISO 11114-1.

24. The expert from the United States of America was in general agreement with the data in the table of P200. After liaising with the Federal Institute for Materials Research and Testing (BAM) and the Gases Industry, he will finalize his validation for the next meeting.

25. At the request of the expert from Canada, P201 will be aligned with the existing UN provisions.

26. The expert from France will issue to Australia, Canada and CGA the CEN standards 1251-1, -2 -3 related to cryogenic receptacles that eventually will be submitted for consideration by the newly formed ISO TC220. The expert from Canada will circulate their standard to Australia, Germany, United Kingdom, United States of America and EIGA. CGA will review the ICAO packing instructions on P203 and make proposals. The whole instruction P203 remains between brackets.

27. After examination of the data supplied by the expert from the United States of America, the periodic inspection for gases of Division 2.3 with a subsidiary corrosivity risk was conditionally fixed at 5 years. The expert from Germany will propose a maximum water content in the gas.

Proposal 4: Requirements for the construction and testing of pressure receptacle for gases

28. The group agreed to reformat the requirements of Chapter 6.2 into:

(a) a first section detailing the general requirements applicable to all pressure receptacles;

(b) a second section providing the requirements for UN certified pressure receptacles incorporating the relevant agreed upon standards;

(c) a third section devoted to the requirements for non-UN certified pressure receptacles (receptacles that are not designed, constructed and tested to standards listed in section 2). This section would be used to develop missing standards in section 2.

29. A number of provisions have been accepted by the group, editorial changes made and other provisions have been put between square brackets pending further discussion.

30. AEGPL will circulate copies of EN standards to the Working Group members for possible future reference in section 2 including a rationale for the reference to these standards.

31. The Working Group reviewed the situation of several ISO standards and accepted them for potential reference in section 2.

Proposal 5: proposed text for Part 5

32. The proposal was accepted by the group.

Proposal 6: proposed text for MEGC's in Part 4

33. The restrictions for transport and filling have been aligned with those for the pressure receptacles.

Proposal 7: Requirement for the design, construction, inspection and testing of multiple-element gas containers (MEGCs) intended for the transport of non-refrigerated gases

34. Redundant definitions have been deleted.

35. The requirement for the quick closing device has been deleted since no such equipment exists for this type of container.

36. Reference was made to the relevant provisions of the EN standard for the construction of the manifold.

37. CGA has offered to review all sections related to the pressure-relief devices and will make a proposal for consideration at the next meeting.

38. It was decided to delete the references to ISO 668 and 1161 since dimensions and corner fittings are not to be made mandatory.

39. Editorial changes were made to clarify the requirements for periodic inspection of the MEGC as a unit and its elements.

40. The Working Group agreed to delete a number of unnecessary markings on the marking plate.

41. The Working Group will consider the outcome of the meeting of ISO TC58/WG9 related to the Technical Report on Quality Assurance for cylinders.

* * *

Annex 2

Draft amendments to the Model Regulations on the Transport of Dangerous Goods (Texts adopted by the Sub-Committee)

(Refer to ST/SG/AC.10/C.3/34/Add.2)

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Annex 3

**Transport of dangerous goods documentation
Draft revised Chapter 5.4 and Sub-Section 3.1.2.6 proposed
by the drafting group on documentation
(see para. 38 of the report)**

CHAPTER 5.4

DOCUMENTATION

Introductory note

Note: *These Regulations do not preclude the use of electronic data processing (EDP) and electronic data interchange (EDI) transmission techniques as an aid to paper documentation.*

5.4.1 Dangerous goods transport documentation

5.4.1.1 *General*

Except as otherwise provided, the consignor who offers dangerous goods for transport shall describe the dangerous goods on a transport document and provide additional information and documentation as specified in these Regulations.

5.4.1.2 *Form of the transport document*

A dangerous goods transport document may be in any form, provided it contains all of the information required by these Regulations.

5.4.1.2.1 If both dangerous and non-dangerous goods are listed in one document, the dangerous goods shall be listed first, or otherwise be emphasized.

5.4.1.2.2 *Continuation page*

A dangerous goods transport document may consist of more than one page, provided pages are consecutively numbered.

5.4.1.2.3 The information on a dangerous goods transport document shall be easy to identify, legible and durable.

5.4.1.2.4 *Example of a dangerous goods transport document*

The form shown in figure (xx) is an example of a dangerous goods transport document.

5.4.1.3 ***Consignor, consignee and date***

The name and address of the consignor and the consignee of the dangerous goods shall be included on the dangerous goods transport document. The date the dangerous goods transport document or an electronic copy of it was prepared or given to the initial carrier shall be included.

5.4.1.4. ***Information required on the dangerous goods transport document***

5.4.1.4.1 *Dangerous goods description*

The dangerous goods transport document shall contain the following information for each dangerous substance, material or article offered for transport:

(a) the proper shipping name, as determined according to 3.1.2;

(b) the class or, when assigned, the division of the goods, including for Class 1, the compatibility group letter. [Any assigned subsidiary hazard class or division number(s) shall be entered following the numerical hazard class or division and shall be enclosed in parenthesis. The words "Class" or "Division" may be included preceding the primary or subsidiary hazard class or division numbers];

(c) the UN number preceded by the letters "UN";

(d) where assigned, the packing group for the substance or article which may be preceded by "PG" (e.g."PG II").

5.4.1.4.2 *Sequence of the dangerous goods description*

The dangerous goods description specified above shall be shown in sequence with no additional information interspersed, except as provided in these Regulations. An example of a dangerous goods description is:

"ALLYL ALCOHOL 6.1 (3) UN 1098 I"

***Note**: In addition to the requirements of these Regulations, other elements of information may be required by the competent authority or for certain modes of transport (e.g. flash point or flash point range in °C c.c. for sea transport). Unless permitted or required by these Regulations, additional information shall be placed after the dangerous goods description.*

5.4.1.4.3 *Information which supplements the proper shipping name in the dangerous goods description*

The proper shipping name in the dangerous goods description shall be supplemented as follows:

(a) *Technical names for "n.o.s." and other generic descriptions*. Proper shipping names that are assigned SP 274 in column (6) of the Dangerous Goods List shall be supplemented with their technical or chemical group names as described in 3.1.2.6.

(b) *Empty uncleaned packagings and tanks*. Empty means of containment (including packagings, IBCs, portable tanks, road transport tanks and railway transport tanks) which contain the residue of dangerous goods of other than Class 7 shall be described as such by, for example, placing the words "**EMPTY UNCLEANED**" or "**RESIDUE LAST CONTAINED**" before or after the proper shipping name;

(c) *Wastes*. For waste dangerous goods (other than radioactive wastes) that are being transported for disposal, or for processing for disposal, the proper shipping name shall be preceded by the word "**WASTE**", unless this is already a part of the proper shipping name;

(d) *Elevated temperature materials*. If the proper shipping name of a substance that is transported or offered for transport in a liquid state at a temperature equal to or exceeding 100 °C, or in a solid state at a temperature equal to or exceeding 240 °C, does not convey the elevated temperature condition (for example, by using the term "**MOLTEN**" or "**ELEVATED TEMPERATURE**" as part of the shipping name), the word "**HOT**" shall immediately precede the proper shipping name on the dangerous goods transport document.

5.4.1.5 ***Information required in addition to the dangerous goods description***

In addition to the dangerous goods description the following information shall be included after the dangerous goods description on the dangerous goods transport document

[5.4.1.5.1 *Total quantity of dangerous goods*

Except for empty packagings, the total quantity of dangerous goods covered by the description (by volume or mass as appropriate) of each item of dangerous goods bearing a different proper shipping name, UN number or packing group shall be included. For Class 1 dangerous goods the quantity shall be the net explosive mass. The number of packagings and a description of each packaging shall also be indicated. Abbreviations may be used to specify the unit of measurement for the total quantity.]

5.4.1.5.2 *Limited quantities*

When dangerous goods are transported according to the exceptions for dangerous goods packed in limited quantities provided for in Column 7 of the Dangerous Goods List and Chapter 3.4, the words "**limited quantity**" or "**LTD QTY**" shall be included.

5.4.1.5.3 *Salvage packagings*

For dangerous goods transported in salvage packagings, the words **"SALVAGE PACKAGE"** shall be included.

5.4.1.5.4 *Temperature stabilized substances*

If the proper shipping name of a substance that is transported or is offered for transport includes the word "STABILIZED", or "STABILIZED" is added to the proper shipping name (see 3.1.2.6), when stabilization is by means of temperature control, the control and emergency temperatures [(see 7.1.4.3.1)] shall be indicated in the transport document, as follows:

"Control temperature: ....°C Emergency temperature: .... ° C".

5.4.1.5.5 *Self-reactive substances and organic peroxides*

For self-reactive substances of Division 4.1 and for organic peroxides that require temperature control during transport, the control and emergency temperatures (see 7.1.4.3.1)shall be indicated on the dangerous goods transport document, as follows: **"Control temperature: ....°C Emergency temperature: .... °C".**

5.4.1.5.5.1 When for certain self-reactive and related substances of Division 4.1 and organic peroxides of Division 5.2 the competent authority has permitted the "EXPLOSIVE" subsidiary risk label (model No. 1) to be dispensed with for the specific package, a statement to this effect shall be included.

5.4.1.5.5.2 When organic peroxides and self-reactive substances are transported under conditions where approval is required (for organic peroxides see 2.5.3.2.5, 4.1.7.2.2, 4.2.1.13.1 and 4.2.1.13.3; for self-reactive substances see 2.4.2.3.2.4 and 4.1.7.2.2), a statement to this effect shall be included in the dangerous goods transport document. A copy of the classification approval and conditions of transport for non-listed organic peroxides and self-reactive substances shall be attached to the dangerous goods transport document.

5.4.1.5.5.3 When a sample of an organic peroxide (see 2.5.3.2.5.1) or a self-reactive substance (see 2.4.2.3.2.4(b)) is transported, a statement to this effect shall be included in the dangerous goods transport document.

5.4.1.5.6 *Infectious substances*

[5.4.1.5.6.1 The full address of the consignee shall be shown on the document, together with the name of a responsible person and his telephone number.]

[5.4.1.5.6.2 The transport documents shall show the number of the flight or train, its date and the name(s) of the airport(s) or station(s) of transshipment].

[5.4.1.5.6.3 If the substance is perishable, appropriate warnings shall appear on the transport document, for instance: **"Keep cool, between +2°C and +4°C"** or **"Keep frozen"** or **"Do not freeze".]**

5.4.1.5.7 *Radioactive materials*

5.4.1.5.7.1 The following information shall be included for each consignment of Class 7 material, as applicable, in the order given:

(a) The name or symbol of each radionuclide or, for mixtures of radionuclides, an appropriate general description or a list of the most restrictive nuclides;

(b) A description of the physical and chemical form of the material, or a notation that the material is special form radioactive material or low dispersible radioactive material. A generic chemical description is acceptable for chemical form;

(c) The maximum activity of the radioactive contents during transport expressed in units of becquerels (Bq) with an appropriate SI prefix (see 1.2.2.1). For fissile material, the mass of fissile material in units of grams (g), or appropriate multiples thereof, may be used in place of activity;

(d) The category of the package, i.e. I-WHITE, II-YELLOW, III-YELLOW;

(e) The transport index (categories II-YELLOW and III-YELLOW only);

(f) For consignments including fissile material other than consignments excepted under 6.4.11.2, the criticality safety index;

(g) The identification mark for each competent authority approval certificate (special form radioactive material, low dispersible radioactive material, special arrangement, package design, or shipment) applicable to the consignment;

(h) For consignments of packages in an overpack or freight container, a detailed statement of the contents of each package within the overpack or freight container and, where appropriate, of each overpack or freight container in the consignment. If packages are to be removed from the overpack or freight container at a point of intermediate unloading, appropriate transport documents shall be made available;

(i) Where a consignment is required to be shipped under exclusive use, the statement "EXCLUSIVE USE SHIPMENT"; and

(j) For LSA-II, LSA-III, SCO-I and SCO-II, the total activity of the consignment as a multiple of A_2.

5.4.1.5.7.2 The transport document shall include a statement regarding actions, if any, that are required to be taken by the carrier. The statement shall be in the languages deemed necessary by the carrier or the authorities concerned, and shall include at least the following points:

(a) Supplementary requirements for loading, stowage, carriage, handling and unloading of the package, overpack or freight container including any special stowage provisions for the safe dissipation of heat (see 7.1.6.3.2), or a statement that no such requirements are necessary;

(b) Restrictions on the mode of transport or conveyance and any necessary routing instructions;

(c) Emergency arrangements appropriate to the consignment.

5.4.1.5.7.3 The applicable competent authority certificates need not necessarily accompany the consignment. The consignor shall make them available to the carrier(s) before loading and unloading.

5.4.1.6 *Certification*

5.4.1.6.1 The dangerous goods transport document shall include a certification or declaration that the consignment is acceptable for transport and that the goods are properly packaged, marked and labelled, and in proper condition for transport in accordance with the applicable regulations. The text for this certification is:

> "I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations."

The certification shall be signed and dated by the consignor. Facsimile signatures are acceptable where applicable laws and regulations recognize the legal validity of facsimile signatures.

5.4.1.6.2 If the dangerous goods documentation is presented to the carrier by means of electronic data processing (EDP) or electronic data interchange (EDI) transmission techniques, the signature(s) may be replaced by the name(s) (in capitals) of the person authorized to sign.

5.4.2 Container packing certificate

5.4.2.1 When dangerous goods are loaded into a freight container 1/, those responsible for supervising this operation 2/ shall provide a "container packing certificate" certifying that the operation has been carried out in accordance with the following conditions, and identifying the person signing the certificate:

(a) The container is clean, dry and apparently fit to receive the goods;

(b) Packages which shall be segregated, i.e. in different freight containers, have not been loaded together in the container;

(c) All packages have been externally inspected for damage, and only sound packages loaded;

(d) All goods have been properly loaded and, where necessary, adequately braced with securing material to suit the mode(s) of transport for the intended journey;

(e) Goods loaded in bulk have been evenly distributed within the container;

(f) For consignments including goods of Class 1 other than Division 1.4, the container is structurally serviceable in accordance with 7.1.3.2.1;

(g) The container and packages are properly marked, labelled and placarded in accordance with this Part; and

(h) A certificate or declaration, as indicated in 5.4.1.1.8, has been received for each dangerous goods consignment loaded in the container.

5.4.2.2 The functions of the document required in 5.4.1.3.1 and of the container packing certificate required in 5.4.2.1 may be incorporated in a single document. If these functions are incorporated into a single document, the inclusion of a signed declaration that the packing of the container has been carried out in accordance with the applicable modal regulations together with the identification of the person signing the declaration will suffice. If these functions are not incorporated into a single document, the relevant documents shall be attached one to the other.

1/ *For the purposes of these provisions the term "freight container" is limited to transport units meeting the definition of "container" in the International Convention for Safe Containers (CSC) signed at Geneva on 2 December 1972. The term does not include a "portable tank" as defined in 1.2.1 or a freight container being used to transport radioactive material and which complies with the IAEA requirements for freight containers.*

2/ *Guidelines for use in practice and in training for loading goods in freight containers or vehicles have been drawn up by the International Maritime Organization (IMO) and the International Labour Organization (ILO) and have been published by IMO (IMO/ILO Guidelines for Packing Cargo in Freight Containers or Vehicles).*

5.4.3 Emergency response information

For consignments for which a dangerous goods transport document is required by these Regulations, appropriate information shall be immediately available at all times for use in emergency response to accidents and incidents involving dangerous goods in transport. The information shall be available away from the packages containing the dangerous goods and immediately accessible in the event of an accident or incident. Methods of compliance include:

(a) Appropriate entries in the transport document; or

(b) Provision of a separate document such as a safety data sheet; or

(c) Provision of a separate document, such as the ICAO "Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods" or the IMO "Emergency Procedures for Ships Carrying Dangerous Goods" and "Medical First Aid Guide in Accidents Involving Dangerous Goods", for use in conjunction with the transport document.

CHAPTER 3.1 (Amendments)

3.1.2.6 *Generic or "not otherwise specified" (N.O.S) names*

3.1.2.6.1 Generic and "not otherwise specified" proper shipping names that are assigned SP 274 in column (6) of the Dangerous Goods List shall be supplemented with their technical or chemical group names unless a national law or international convention prohibits its disclosure if it is a controlled substance. For explosives of Class 1, the dangerous goods description may be supplemented by additional descriptive text to indicate commercial or military names. Technical and chemical group names shall be entered in parentheses immediately following the proper shipping name. An appropriate modifier, such as "contains" or "containing" or other qualifying words such as `mixture', `solution', etc. and the percentage of the technical constituent may also be used. For example: "Flammable liquids, n.o.s. (contains Xylene and Benzene), 3, UN 1993, PG II".

3.1.2.6.1.1 The technical name shall be a recognized chemical or other name currently used in scientific and technical handbooks, journals and texts. Trade names shall not be used for this purpose. In the case of pesticides, only ISO common name(s), other name(s) in the WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification, or the name(s) of the active substance(s) may be used.

3.1.2.6.1.2 When a mixture of dangerous goods is described by one of the "N.O.S." or "generic" entries to which Special Provision 274 has been allocated in the Dangerous Goods List, not more than the two constituents which most predominantly contribute to the hazard or hazards of a mixture need to be shown, excluding controlled substances when their disclosure is prohibited by national law or international convention. If a package containing a mixture is labelled with any subsidiary risk label, one of the two technical names shown in parentheses shall be the name of the constituent which compels the use of the subsidiary risk label.

3.1.2.6.1.3 Examples illustrating the selection of the proper shipping name supplemented with the technical name of goods for such N.O.S. entries are:

UN 2003 METAL ALKYL, N.O.S. (trimethylgallium)
UN 2902 PESTICIDE, LIQUID, TOXIC, N.O.S. (drazoxolon).

* * *

Annex 4

Texts provisionally adopted for ammonium nitrate entries
(see para. 48 of the report)

Delete the following entries:

UN 0223, UN 2068, UN 2069, UN 2070, UN 2072

Amend existing entries for UN Nos 1942, 2067 and 2071 to read as follows:

UN No	Class	Name and Description	Special Provision
1942	5.1	AMMONIUM NITRATE, with not more than 0.2% total combustible material, including any organic substance, calculated as carbon to the exclusion of any other added substance	[AAA]
2067	5.1	AMMONIUM NITRATE BASED FERTILIZER	186 [AAA], BBB
2071	9	AMMONIUM NITRATE BASED FERTILIZER	186193

***NOTE**: The final version for the columns of Name and Description and Special provisions as well as the text of the special provisions 193, AAA, BBB (which will be derived from the merging of special provisons BBB and CCC of ST/SG/AC.10/C.3/1999/59) will be discussed at the next session.*

The existing description in lower case for UN 0222 should be discussed in the light of decisions to be taken for new special provision AAA.

(Ref. doc. ST/SG/AC.10/C.3/1999/59)

* * *

Annex 5

Report of the United Nations/ILO Working Group on the Harmonization of the Classification Criteria for Physical Hazards

1. The United Nations/ILO Working Group on the Harmonization of Classification Criteria for Physical Hazards met on 13 December 1999 under the chairmanship of Mr. G. Oberreuter (Germany).

2. The representatives of the following countries and organizations took part in this session of the Working Group: Argentina, Australia; Austria; Bahamas; Belgium; Brazil; Canada; China; Czech Republic; France; Germany; Italy; Japan; Mexico; Netherlands; Norway; Russian Federation; South Africa; Spain; Sweden; Switzerland; United Kingdom; United States of America; International Labour Office (ILO); European Commission (EC); Chemicals Specialities Manufacturers Association (CSMA); Federation of European Aerosol Associations (FEA); Hazardous Materials Advisory Council (HMAC) and the Programme national de prévention de lutte et d'assistance humanitaire aux victimes des catastrophes naturelles (PRONAPLUCAN).

General

Document : ST/SG/AC.10/C.3/28/Add.3

3. It was recalled that the United Nations/ILO Working Group on the Harmonization of the Classification Criteria for Physical Hazards had nearly completed its work in December 1997, except for criteria for aerosol flammability (ST/SG/AC.10/C.3/28/Add.3, paras. 27-34) and that the Committee of Experts on the Transport of Dangerous Goods had agreed that the UN/ILO Working Group should be reconvened during the seventeenth session of the Sub-Committee (ST/SG/AC.10/25, paras. 121-122) to discuss proposals that FEA intended to prepare in co-operation with non-European industrial associations concerned with aerosols.

Documents: ST/SG/AC.10/C.3/1999/64 (Norway)
ST/SG/AC.10/C.3/1999/68, -/Add.1 and -/Add.2 (FEA)
ST/SG/AC.10/C.3/1999/76 (CSMA)

Informal documents : INF.22 (FEA)
INF.27 (France)
INF.41 (Germany)
INF.47 (CSMA)

4. The Working Group noted that the Chemical Specialities Manufacturers Association (CSMA) of the United States of America which is a national non-governmental organization not in consultative status either with the Economic and Social Council or the Committee of Experts on the Transport of Dangerous Goods had requested to be consulted and to participate in the debate, and had prepared a proposal different from that of FEA. This request was supported by the representative of the United States and, as there were no objections from any delegations, accepted by the Working Group.

5. In accordance with the guidance provided at the previous session, FEA proposed classification criteria based on FEA test methods (Ignition distance test (FEA 609), Enclosed space test (FEA 610) and Foam test (FEA 608)) applicable for determining the flammability of aerosols in the context of consumer use on the one hand and of transport on the other hand. For consumer use, all aerosols with flammable contents were deemed to be flammable, except those with flammable contents not more than 25% by mass and not more than 150 g, which could be tested to determine whether they could be considered as non-flammable. For transport, the same applied, except that aerosols having flammable contents below 7% by mass were regarded de facto as non-flammable and the criteria for aerosols with flammable contents between 7% and 25% were different from that for transport.

6. For transport regulations, this implied considering all aerosols with flammable contents above 7% as flammable except for those with flammable contents between 7% and 25% where non-flammability could be proved by testing. At present, aerosols with flammable contents below 45% and 150 g are considered as non-flammable.

7. The representative of FEA explained that the 25% flammable contents higher limit above which aerosols would be considered as flammable replaced the 45% limit presently used for transport (see special provision 63 in Chapter 3.3 of the UN Model Regulations), because experience with new propellants substituting the now banned CFCs has shown that this limit was more appropriate. The representative of CSMA did not agree as he said that many products with flammable contents between 25% and 45%, when tested, would not meet the flammability criteria.

8. The lower limit of 7% under which aerosols would be considered as non-flammable under transport regulations was also questioned, as no data had been presented. Furthermore, as aerosols with flammable contents below 7% would have to be tested for being considered as non-flammable under consumer use regulations, certain delegations wondered whether it was really justified to distinguish the use of aerosols and their transport, as the tests performed on these aerosols in the context of consumer use could be used at the same time to determine the possible flammabillity according to transport criteria. Therefore, they would be in favour of using one set of criteria only for all applications.

9. The representative of France pointed out that the same tests would have to be carried out for transport and for consumer use, but that during the closed drum test an additional value would have to be measured (explosion density) which was more appropriate for transport classification.

10. Certain delegations objected to the idea that tests would have to be performed on any aerosols with flammable contents below 25% to prove their non-flammability, as they considered that aerosols with very low flammable contents (e.g. 0.5%, 1% or any other limit to be determined on the basis of test data available) would be considered as non-flammable without testing.

11. The representative of Italy said that the question of cut-off values would have to be addressed also in the context of the global harmonization of classification criteria for mixtures.

12. The CSMA proposed that aerosols with flammable contents of more than 45% could be assumed flammable without testing or alternatively could be classified not flammable based on the drum test and ignition distance or foam test. In addition, aerosols with flammable contents below 45% (i.e. not presently subject to transport regulations) would be subject to an Ignition distance test or Foam test to determine whether they are flammable or not.

13. For this proposal, it was noted that the flash point limit proposed for defining flammable constituants was 60 °C, while this limit was 100 °C in existing transport regulations. It was agreed that "flammable contents" should mean all substances defined as flammable under the globally harmonized system, i.e. flammable solids, liquids with a flash point not more than 93 °C and flammable gases.

14. The representative of CSMA proposed that aerosols with more than 85% flammable contents should be classified as extremely flammable. The representative of France had also proposed criteria for determining hazard levels (INF.27) (Extremely flammable, highly flammable, flammable), and he said that communication of these hazard levels to consumers would be an incentive for the industry to produce low hazard level aerosols.

15. The representative of the United States agreed that extreme flammability should be identified, in particular for consumer safety purposes. He considered that detailed fire-fighting aspects linked to risk assessment in case of storage of large quantities of aerosols should be avoided in hazard classification.

16. Several other delegations were not convinced of the need for determining hazard levels.

17. With regard to the CSMA proposed classification flow chart, it was noted that aerosols with flammable contents below 45% were subject to the ignition distance test or to the foam test only, but not to the drum test. Therefore the question was asked whether it could be assumed that such aerosols passing the ignition distance test or the foam test would also pass the drum test. The representative of FEA said that this could not be assumed.

18. It was underlined that the FEA Enclosed Space Test and CSMA Drum test were more appropriate to determine flammability for transport and storage purposes (i.e. closed aerosols dispensers) while the Flame ignition distance test and Foam test were more suitable for determining the flammability hazard during the use of aerosols. The Netherlands wished that storage aspects be taken into account in developing criteria for flammability of aerosols.

19. After long discussions on the above subjects, the Chairman concluded that the Working Group could not reach a consensus on all issues, and that the only agreed principles were that

(a) all aerosols containing flammable components meeting criteria for flammability (i.e. flammable solids or gases and liquids with a flash point not more than 93 °C) should be considered for flammability and a test regime should be applied;

(b) three tests (Ignition distance test, Enclosed space test and Foam test) are relevant for determining flammability of aerosols, and FEA and CSMA should prepare a joint proposal for test methods to be included in the Manual of Tests and Criteria, as existing CSMA and FEA tests are quite similar;

(c) if positive results are obtained in any of the test, the aerosols shoud be classified flammable.

20. The representative of FEA expressed his disappointment at this conclusion, because he considered that FEA had developed appropriate harmonization proposals on the basis of the request of the working group, in consultation with non-European organizations, and that all elements had been provided for a sound compromise.

21. The Working Group agreed that another meeting at the next session would be needed to reach a better compromise, provided that new proposals are developed by interested delegations.

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COMMITTEE OF EXPERTS ON THE TRANSPORT
OF DANGEROUS GOODS

Sub-Committee of Experts on the
Transport of Dangerous Goods

REPORT OF THE SUB-COMMITTEE OF EXPERTS ON ITS SEVENTEENTH SESSION

(Geneva, 6-15 December 1999)

Addendum 1

Annex to the Report of the Working Group on Gas Receptacles and Multiple-Element Gas Containers (MEGCs)

1. Reference is made to the report of the Working Group on Gas Receptacles and Multiple-Element Gas Containers (MEGCs) (see ST/SG/AC.10/C.3/34, annex 1).

2. The texts proposed by the Working Group are reproduced below (see also ST/SG/AC.10/C.3/34, para. 17).

GE.00- 20811

Proposal 1

Proposed texts: 1.2.1 Definitions

The following definitions should be added at the appropriate places.

Bundles of cylinders are assemblies of cylinders held firmly together and which are interconnected by a manifold and transported as a unit. The total water capacity shall not exceed 3000 litres; bundles intended for the transport of toxic gases of division 2.3 shall be limited to 1000 litres water capacity;

Cylinders are transportable pressure receptacles of a water capacity not exceeding 150 litres;

Cryogenic receptacles are transportable thermally insulated receptacles closed or not for refrigerated liquefied gases of a water capacity of not more than 1000 litres;

Multiple-element gas containers (MEGC's) are multimodal assemblies of cylinders, tubes and bundles of cylinders which are interconnected by a manifold and which are assembled within a framework. The multiple-element gas container includes service equipment and structural equipment necessary for the transport of gases;

Pressure drums are welded transportable pressure receptacles of a water capacity exceeding 150 litres and of not more than[1000] litres, (e.g. cylindrical receptacles equipped with rolling hoops, receptacles on skids and receptacles in frames);

Tubes are seamless transportable pressure receptacles of a water capacity exceeding 150 litres and of not more than 3000 litres;

Pressure receptacles is a collective term that includes cylinders, tubes, pressure drums, closed cryogenic receptacles and bundles of cylinders";

Filling ratio is the ratio of the mass of liquefied gas introduced in a container to the mass of water at 15°C that would fill the same container fitted ready for use;

Settled pressure is the pressure attained by a gas or gas mixture in a gas receptacle in thermal and diffusive equilibrium;

Working pressure is the settled pressure of a compressed gas at the reference temperature of 15 °C in a full receptacle;

Test pressure is the required pressure applied during a pressure test for qualification or requalification;

[Authorised body]

Proposal 2

2.2.1 Definitions and general provisions

Paragraph 2.2.1.2 shall be replaced with the following text:

"2.2.1.2 The transport condition of a gas is described according to its physical state as:

(a) ***Compressed gas*** - a gas which when packaged under pressure for transport is entirely gaseous at -50 °C. This category includes all gases with a critical temperature below -50 °C;

(b) ***Liquefied gas*** - a gas which when packaged under pressure for transport is partially liquid at temperatures above -50 °C. A distinction is made between:

High pressure liquefied gas - gases with a critical temperature between -50 °C and +65 °C,

Low pressure liquefied gas - gases with a critical temperature above +65 °C;

(c) ***Refrigerated liquefied gas*** - a gas which when packaged for transport is made partially liquid because of its low temperature;

(d) ***Gas in solution*** - a gas which when packaged under pressure for transport is dissolved in a solvent."

Proposal 3

4.1.6 Special packing provisions for dangerous goods of Class 2

4.1.6.1 ***General requirements***

4.1.6.1.1 Pressure receptacles, including their closures, shall be selected to contain a gas or a mixture of gases according to the requirements of section 6.2.1.2 "Materials of pressure receptacles" and the requirements of the specific packing instructions of section 4.1.4.2. This section also applies to pressure receptacles which are elements of MEGC's. The provisions of ISO 11114-1,-2 shall be met as appropriate.

4.1.6.1.2 Refillable pressure receptacles shall not be filled with a gas or gas mixture different from that previously contained unless the necessary operations for change of gas service have been performed. The provisions of ISO 11621:1997 [or CGA C-10] shall be met. In addition, a pressure receptacle that previously contained liquid substances with corrosive properties shall not be put in class 2 service unless the necessary inspection and testing as defined in 6.2.1.5 have been performed.

4.1.6.1.3 Pressure receptacles with the exception of open cryogenic receptacles, including their closures, shall conform to the design, construction, inspection and testing requirements detailed in section 6.2. When outer packagings are prescribed, the pressure receptacles shall be firmly secured therein. Unless otherwise specified in the detailed packing instructions, one or more inner packagings may be enclosed in an outer packaging.

4.1.6.1.4 Valves shall be protected from damage which could cause release of the contents of the pressure receptacle, if the pressure receptacle falls during storage, transport or handling, by one of the following methods:

(a) Valves are placed inside the neck of the pressure receptacle and protected by a screw-threaded plug or cap;

(b) Valves are protected by caps. Caps shall possess vent-holes of sufficient cross-sectional area to evacuate the gas if leakage occurs at the valves;

(c) Valves are protected by shrouds or guards;

(d) Valves are designed and constructed in such a way that they are inherently able to withstand damage without leakage of product;[ISO 10297, Annex A]

(e) Valves are placed inside a protective frame;

(f) Pressure receptacles are carried in protective boxes or frames.

For pressure receptacles with valves as described in (b) and (c), the requirements of ISO 11117:1998 shall be met; [for unprotected valves as described in (d), the requirements of the annex of ISO 10297 shall be met].

4.1.6.1.5 Pressure receptacles, containing pyrophoric gases and gases with an LC50 lower than or equal to 200ppm shall have their valve openings fitted with gas-tight plugs or cap nuts which shall be made of a material compatible with the contents of the pressure receptacle.

4.1.6.1.6 Pressure receptacles may be transported after the expiry of the time-limit set for the periodic inspection prescribed. Pressure receptacles shall not be charged or filled after they become due for periodic inspection.

4.1.6.1.7 Refillable pressure receptacles shall be periodically inspected according to the provisions of P 200 and P 203.

4.1.6.1.8 Pressure receptacles shall not be offered for filling or transport:

(a) when leaking;
(b) when damaged to such an extent that the integrity of the pressure receptacle or its service equipment may be affected;
(c) unless the pressure receptacle and its service equipment has been examined and found to be in good working order;
(d) unless the markings necessary for filling are legible or;
(e) unless for the purpose of repair in accordance with these regulations.

4.1.6.2 Insert the following packing instructions

P200	Packing instruction	P200

This packing instruction applies to Class 2 compressed, liquefied gases and gases in solution. The general packing requirements of 4.1.6.1 shall be met.
The following types of pressure receptacles are authorized:
Cylinder, tubes, pressure drums and bundles of cylinders.

200 (a) Pressure receptacles shall be closed and leakproof as to prevent escape of the gases. Pressure receptacles containing toxic gases with a LC50 lower than or equal to 200ppm as specified in the table shall not be equipped with any pressure-relief device. Pressure-relief devices shall be fitted on receptacles intended for the transport of UN 1013 carbon dioxide and UN 1070 nitrous oxide. [Other pressure receptacles shall be fitted with a pressure-relief device where specified by the competent authority. The bursting component of the pressure-relief device shall open automatically at a pressure between 100 and 120% of the test pressure. Where fusible components are used, an appropriate temperature range for functioning shall be specified by the competent authority (see CGA pamphlet S.1.1 and ISO 3807-2 for acetylene cylinders).]

200(b) The following tables:

- identify the types of pressure receptacles authorised for a gas;
- identify the test pressure, the filling ratio and the maximum water capacity for the various gases, as well as restrictions concerning toxic gases with $LC_{50} < 200$ ppm;
- refer to additional requirements that are specific to a gas.

200(c) For compressed gases, the working pressure shall be not more than two thirds of the test pressure of the pressure receptacles. In no case shall the internal pressure at 65 °C exceed the test pressure.

200(d) For high pressure liquefied gases, the filling ratio shall be such that the internal pressure at 65 °C does not exceed the test pressure of the pressure receptacles.

200(e) For high pressure liquefied gases and gas mixtures with insufficient thermo-dynamical and physical data, the maximum filling ratio (FR) shall be determined as follows:

Formula

$$FR \leq 8.5 \times 10^{-4} \times d_g \times P_h$$

where FR = maximum filling ratio
d_g = gas density (at 15 °C, 1 bar)(in $g \cdot l^{-1}$)
Ph = minimum test pressure (in bar)

If the density of the gas is unknown, the maximum filling ratio shall be determined as follows:

Formula

$$FR \leq \frac{P_h \times MM \times 10^{-3}}{R \times 338}$$

where FR = maximum filling ratio
P_h = minimum test pressure (in bar)
MM = molecular mass (in $g \cdot mol^{-1}$)
R = $8.31451 \cdot 10^{-2}$ $bar \cdot l \cdot mol^{-1} \cdot K^{-1}$ (gas constant)

For gas mixtures the average molecular mass is to be taken, taking into account the volumetric concentrations of the various components;

P200	Packing instruction (cont'd)	P200

200(f) For low pressure liquefied gases, the maximum mass of contents per litre of capacity (filling factor) equals 0.95 times the density of the liquid phase at 50 °C; in addition, the vapour phase shall not disappear below 60 °C. The test pressure will be at least equal to the vapour pressure (absolute) of the liquid at 65 °C, minus 100 kPa (1 bar).

200(g) For pure low pressure liquefied gases with insufficient thermo-dynamical or physical data the maximum filling ratio shall be determined as follows:

Formula $FR \leq (0.0032 \times BP - 0.24) \times d_l$

where FR = maximum filling ratio
BP = boiling point (in Kelvin)
d_l = density of the liquid at boiling point (in $g \cdot l^{-1}$)

200(h) For acetylene, dissolved, UN 1001, once equilibrium has been achieved at 15 °C, the working pressure shall not exceed the value prescribed by the competent authority for the porous mass. The quantity of solvent and the quantity of acetylene shall likewise correspond to the figures specified in the approval.

200(i) Refillable pressure receptacles shall be subjected to periodic inspections in accordance with the provisions of section 6.2.

200(j) If special requirements for certain substances do not appear in the table below, periodic inspections shall be carried out:

(a) Every 5 years in the case of receptacles intended for the carriage of gases of division 2.3; for gases with a subsidiary corrosive risk where the moisture content is above [...] the period is reduced to 3 years;

(b) Every 10 years in the case of receptacles intended for the carriage of gases of division 2.1 and of division 2.2.

200(k) Keys for the column " receptacles"

(1) Cylinders;
(2) Tubes;
(3) Pressure drums;
(4) MEGC;
(5) Bundles of cylinders.

200(l) Keys for the column "Special requirements":

a: Aluminium alloys shall not be in contact with the gas (see ISO 11114-1).

b: Valves made of copper shall not be used (see ISO 11114-1).

c: Metal parts in contact with the contents shall not contain more than 70% copper (see ISO 11114-1).

d: A pressure receptacle shall not contain more than 5 kg of the gas.

e: The valve outlets shall be fitted with plugs or cap-nuts ensuring gas-tightness.

P200	Packing instruction (cont'd)	P200

f: The necessary steps shall be taken to prevent dangerous reactions (e.g. polymerisation, decomposition) during transport. If necessary, stabilisation or addition of an inhibitor is required.

g: The use of test pressures and filling ratio combinations other than those indicated are permitted provided that the settled pressure at 65 °C does not exceed the test pressure of the receptacle (re. 200(d)).

h: If a non-monolithic material is used as a porous mass, the interval between inspections shall be maximum of 5 years. [Those cylinders will not bear a UN marking]. Receptacles fitted with relief devices or manifolded together shall be transported vertically.

i: The maximum filling ratio shall be in accordance with the figures specified in the approval.

j: The test pressure and filling ratio shall be calculated in accordance with the requirements of 200(d) and 200 (e).

k: The interval between tests may be extended to 10 years when the pressure receptacles are made of aluminium alloys that have been subjected to stress corrosion testing as specified in ISO 7866.

l: Each cylinder within a bundle shall be fitted with an individual valve that shall be closed during transport.

[m: The interval between inspections for steel cylinders may be extended to 15 years:

(a) with the agreement of the competent authority (authorities) of the country (countries) where the periodic inspection and the transport take place; and

(b) in accordance with the requirements of standard ISO/DIS 10464 "Liquefied petroleum gas (LPG) cylinders - Periodic inspection and testing".]

[n: A pressure receptacle with a test pressure greater than or equal to 200 bar shall be used unless the receptacle is shipped in a secondary rigid packaging or calculation shows an equivalent resistance to mechanical impact.]

o: Compatibility with the material shall be checked when steel receptacles with a tensile strength above 950 MPa are to be used (see ISO 11114-1).

z: In the case of pressure receptacles for the transport of gases under an N.O.S. description, the following requirements shall be complied with as applicable:

(1) The materials of which the pressure receptacles and their accessories are made shall be compatible with the contents and shall not form harmful or dangerous compounds therewith.

(2) The test pressure and filling ratio shall be calculated in accordance with the requirements of paragraphs 200 (c), 200 (d) and 200 (e).

(3) Toxic gases and gas mixtures with LC_{50} < 200 ppm shall not be transported in tubes and pressure drums.

P200	Packing instruction (cont'd)	P200
	(4) The valves of pressure receptacles for toxic gases and gas mixtures with a LC_{50} less than 200 ppm or for pyrophoric gases or flammable mixtures of gases containing more than 1% of pyrophoric compounds shall be fitted with gas tight plugs or cap-nuts. When these pressure receptacles are manifolded in a bundle, each of the pressure receptacles shall be fitted with an individual valve that shall be closed during transport and the outlet manifold valve shall be plugged.	
	(5) The necessary steps shall be taken to prevent dangerous reactions (i.e. polymerisation, decomposition) during transport. If necessary, stabilisation or addition of an inhibitor is required.	

Note: The table will be rearranged in UN number order pending comments on content and layout to be provided by the participants.

Identification No	Name of the substance or article	Receptacles	TEST			FILLING	Special requirements
			PRESSURE		PERIOD (years) */	MAX. FILL. ratio kg/l or MPa or Vol %	
			X working pressure	MPa			
1002	AIR, COMPRESSED	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	
1006	ARGON, COMPRESSED	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	
1046	HELIUM, COMPRESSED	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	
1056	KRYPTON, COMPRESSED	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	
1065	NEON, COMPRESSED	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	
1066	NITROGEN, COMPRESSED	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	
1979	RARE GASES MIXTURE, COMPRESSED	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	
1980	RARE GASES AND OXYGEN MIXTURE, COMPRESSED	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	
1981	RARE GASES AND NITROGEN MIXTURE, COMPRESSED	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	
1982	TETRAFLUOROMETHANE, COMPRESSED (REFRIGERANT GAS R 14, COMPRESSED)	(1),(2),(3),(4),(5)		20	10	0.62	g
		(1),(2),(3),(4),(5)		30		0.94	g
2036	XENON, COMPRESSED	(1),(2),(3),(4),(5)		13	10	1.24	g
2193	HEXAFLUOROETHANE, COMPRESSED (REFRIGERANT GAS R 116, COMPRESSED)	(1),(2),(3),(4),(5)		20	10	1.10	g
1956	COMPRESSED GAS, N.O.S.	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	z
1014	CARBON DIOXIDE AND OXYGEN MIXTURE, COMPRESSED	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	

Identification No	Name of the substance or article	Receptacles	TEST			FILLING	Special requirements
			PRESSURE		PERIOD (years) */	MAX. FILL. ratio kg/l or MPa or Vol %	
			X working pressure	MPa			
2451	NITROGEN TRIFLUORIDE	(1),(2),(3),(4),(5)		20	10	0.5	g
		(1),(2),(3),(4),(5)		30		0.75	g
3156	COMPRESSED GAS, OXIDIZING, N.O.S.	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	z
1049	HYDROGEN, COMPRESSED	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	o
1957	DEUTERIUM, COMPRESSED	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	o
1962	ETHYLENE, COMPRESSED	(1),(2),(3),(4),(5)		22.5	10	0.34	g
		(1),(2),(3),(4),(5)		30.0	10	0.37	g
1971 1971	METHANE, COMPRESSED or NATURAL GAS, COMPRESSED with high methane content	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	
2034	HYDROGEN AND METHANE MIXTURE, COMPRESSED	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	
2203	SILANE, COMPRESSED **/	(1),(2),(3),(4),(5)		22.5	10	0.32	e,g,l,o
		(1),(2),(3),(4),(5)		25.0	10	0.41	e,g,l,o
1964	HYDROCARBON GAS MIXTURE, COMPRESSED,N.O.S	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	z
1954	COMPRESSED GAS, FLAMMABLE, N.O.S	(1),(2),(3),(4),(5)	1.5		10	2/3 T.P.	z
1612	HEXAETHYL TETRAPHOSPHATE AND COMPRESSED GAS MIXTURE	(1),(2),(3),(4),(5)	1.5		5	2/3 T.P.	z
1955	COMPRESSED GAS, TOXIC, N.O.S.	(1),(2),(3),(4),(5)	1.5		5	2/3 T.P.	z
1016	CARBON MONOXIDE, COMPRESSED	(1),(2),(3),(4),(5)	1.5		5	2/3 T.P.	k
1023	COAL GAS, COMPRESSED	(1),(2),(3),(4),(5)	1.5		5	2/3 T.P.	
1071	OIL GAS, COMPRESSED	(1),(2),(3),(4),(5)	1.5		5	2/3 T.P.	
1911	DIBORANE, COMPRESSED	(1),(5)		25.0	5	0.072	e,f,l,o
2600	CARBON MONOXIDE AND HYDROGEN MIXTURE, COMPRESSED	(1),(2),(3),(4),(5)	1.5		5	2/3 T.P.	k,o
1953	COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S.	(1),(2),(3),(4),(5)	1.5		5	2/3 T.P.	z
1008	BORON TRIFLUORIDE, COMPRESSED	(1),(2),(3),(4),(5)		22.5	5	0.715	g
		(1),(2),(3),(4),(5)		30.0		0.86	g

Identification No	Name of the substance or article	Receptacles	TEST			FILLING	Special requirements
			PRESSURE		PERIOD (years) */	MAX. FILL. ratio kg/l or MPa or Vol %	
			X working pressure	MPa			
1859	SILICON TETRAFLUORIDE, COMPRESSED	(1),(2),(3),(4),(5)		20	5	0.74	g
		(1),(2),(3),(4),(5)		30		1.1	g
2198	PHOSPHORUS PENTAFLUORIDE, COMPRESSED	(1),(5)		20	5	0.9	e,g,l
		(1),(5)		30		1.34	e,g,l
2417	CARBONYL FLUORIDE, COMPRESSED	(1),(2),(3),(4),(5)		20	5	0.47	g
		(1),(2),(3),(4),(5)		30		0.7	g
3304	COMPRESSED GAS, TOXIC, CORROSIVE, N.O.S.	(1),(2),(3),(4),(5)	1.5		5	2/3 T.P.	z
3303	COMPRESSED GAS, TOXIC, OXIDIZING, N.O.S.	(1),(2),(3),(4),(5)	1.5		5	2/3 T.P.	z
3305	COMPRESSED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S.	(1),(2),(3),(4),(5)	1.5		5	2/3 T.P.	z
1045	FLUORINE, COMPRESSED	(1),(5)		20.0	5	2.8 MPa	a,d,e,l
1660	NITRIC OXIDE, COMPRESSED	(1),(5)	1.5		5	2/3 T.P.	e,l
2190	OXYGEN DIFLUORIDE	(1),(5)		20.0	5	2.8 MPa	a,d,e,l,n
3306	COMPRESSED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.	(1),(2),(3),(4),(5)	1.5		5	2/3 T.P.	z
1009	BROMOTRIFLUORO-METHANE (REFRIGERANT GAS R 13B1)	(1),(2),(3),(4),(5)		4.2	10	1.13	g
		(1),(2),(3),(4),(5)		12.0	10	1.44	g
		(1),(2),(3),(4),(5)		25.0	10	1.60	g
1013	CARBON DIOXIDE	(1),(2),(3),(4),(5)		19.0	10	0.66	g
		(1),(2),(3),(4),(5)		25.0	10	0.75	g
1015	CARBON DIOXIDE AND NITROUS OXIDE MIXTURE	(1),(3),(5)		25.0	10	0.75	g
1018	CHLORODIFLUORO-METHANE (REFRIGERANT GAS R 22)	(1),(2),(3),(4),(5)		2.9	10	1.03	
1020	CHLOROPENTAFLUORO-ETHANE (REFRIGERANT GAS R 115)	(1),(2),(3),(4),(5)		2.5	10	1.08	
1021	1-CHLORO-1,2,2,2-TETRA-FLUOROETHANE (REFRIGERANT GAS R 124)	(1),(2),(3),(4),(5)		1.2	10	1.2	

Identification No	Name of the substance or article	Receptacles	TEST			FILLING	Special requirements
			PRESSURE		PERIOD (years) */	MAX. FILL. ratio kg/l or MPa or Vol %	
			X working pressure	MPa			
1022	CHLOROTRIFLUORO-METHANE (REFRIGERANT GAS R 13)	(1),(2),(3),(4),(5)		10.0	10	0.83	g
		(1),(2),(3),(4),(5)		12.0	10	0.90	g
		(1),(2),(3),(4),(5)		19.0	10	1.04	g
		(1),(2),(3),(4),(5)		25.0	10	1.10	g
1028	DICHLORODIFLUORO-METHANE (REFRIGERANT GAS R 12)	(1),(2),(3),(4),(5)		1.8	10	1.15	
1029	DICHLOROFLUORO-METHANE (REFRIGERANT GAS R 21)	(1),(2),(3),(4),(5)		1.0	10	1.23	
1058	LIQUEFIED GASES, non-flammable, charged with nitrogen, carbon dioxide or air	(1),(2),(3),(4),(5)	1.5		10		j
1080	SULPHUR HEXAFLUORIDE	(1),(2),(3),(4),(5)		7.0	10	1.04	g
		(1),(2),(3),(4),(5)		14.0	10	1.33	g
		(1),(2),(3),(4),(5)		16.0	10	1.37	g
1858	HEXAFLUOROPROPYLENE (REFRIGERANT GAS R 1216)	(1),(2),(3),(4),(5)		2.2	10	1.11	
1952	CARBON DIOXIDE AND ETHYLENE OXIDE MIXTURE	(1),(2),(3),(4),(5)		19	10	0.66	
	with not more than 9% ethylene oxide	(1),(2),(3),(4),(5)		25	10	0.75	
1958	DICHLOROTETRAFLUORO-ETHANE (REFRIGERANT GAS R 114)	(1),(2),(3),(4),(5)		1.0	10	1.30	
1973	CHLORODIFLUORO-METHANE AND CHLOROPENTAFLUORO-ETHANE MIXTURE with fixed boiling point, with approximately 49% chlorodifluoromethane (REFRIGERANT GAS R 502)	(1),(2),(3),(4),(5)		3.1	10	1.05	
1974	CHLORODIFLUOROBROMO-METHANE (REFRIGERANT GAS R 12B1)	(1),(2),(3),(4),(5)		1.0	10	1.61	
1976	OCTAFLUOROCYCLO-BUTANE (REFRIGERANT GAS RC 318)	(1),(2),(3),(4),(5)		1.1	10	1.34	
1983	1-CHLORO-2,2,2-TRIFLUORO-ETHANE (REFRIGERANT GAS R 133a)	(1),(2),(3),(4),(5)		1.0	10	1.18	

Identification No	Name of the substance or article	Receptacles	TEST			FILLING	Special requirements
			PRESSURE		PERIOD (years) */	MAX. FILL. ratio kg/l or MPa or Vol %	
			X working pressure	MPa			
1984	TRIFLUOROMETHANE (REFRIGERANT GAS R 23)	(1),(2),(3),(4),(5)		19.0	10	0.87	g
		(1),(2),(3),(4),(5)		25.0	10	0.95	g
2422	OCTAFLUOROBUT-2-ENE (REFRIGERANT GAS R 1318)	(1),(2),(3),(4),(5)		1.2	10	1.34	
2424	OCTAFLUOROPROPANE (REFRIGERANT GAS R 218)	(1),(2),(3),(4),(5)		2.5	10	1.09	
2599	CHLOROTRIFLUORO-METHANE AND TRIFLUOROMETHANE, AZEOTROPIC MIXTURE with approximately 60% chlorotrifluoromethane (REFRIGERANT GAS R 503)	(1),(2),(3),(4),(5)		4.2 10.0 10.0	10 10 10	0.20 0.66 0.66	
2602	DICHLORODIFLUORO-METHANE AND 1,1-DIFLUOROETHANE , AZEOTROPIC MIXTURE with approximately 74% dichlorodifluoromethane (REFRIGERANT GAS R 500)	(1),(2),(3),(4),(5)		2.2	10	1.01	
3070	ETHYLENE OXIDE AND DICHLORODIFLUORO-METHANE MIXTURE with not more than 12,5% ethylene oxyde	(1),(2),(3),(4),(5)		1.8	10	1.09	
3159	1,1,1,2-TETRAFLUORO-ETHANE (REFRIGERANT GAS R 134a)	(1),(2),(3),(4),(5)		2.2	10	1.04	
3220	PENTAFLUOROETHANE (REFRIGERANT GAS R 125)	(1),(2),(3),(4),(5)		3.4 3.6	10 10	0.95 0.72	g g
3296	HEPTAFLUOROPROPANE (REFRIGERANT GAS R 227)	(1),(2),(3),(4),(5)		1.5	10	1.2	
3297	ETHYLENE OXIDE AND CHLOROTETRAFLUORO-ETHANE MIXTURE, with not more than 8,8% ethylene oxide	(1),(2),(3),(4),(5)		1.0	10	1.16	
3298	ETHYLENE OXIDE AND PENTAFLUOROETHANE MIXTURE, with not more than 7,9% ethylene oxide	(1),(2),(3),(4),(5)		2.6	10	1.02	
3299	ETHYLENE OXIDE AND TETRAFLUOROETHANE MIXTURE, with not more than 5,6% ethylene oxide	(1),(2),(3),(4),(5)		1.7	10	1.03	
3337	REFRIGERANT GAS R 404A	(1),(2),(3),(4),(5)		3.6	10	0.82	
3338	REFRIGERANT GAS R 407A	(1),(2),(3),(4),(5)		3.6	10	0.94	

Identification No	Name of the substance or article	Receptacles	TEST			FILLING	Special requirements
			PRESSURE		PERIOD (years) */	MAX. FILL. ratio kg/l or MPa or Vol %	
			X working pressure	MPa			
3339	REFRIGERANT GAS R 407B	(1),(2),(3),(4),(5)		3.8	10	0.93	
3340	REFRIGERANT GAS R 407C	(1),(2),(3),(4),(5)		3.5	10	0.95	
1078	REFRIGERANT GASES, N.O.S.	(1),(2),(3),(4),(5)			10		z
1968	INSECTICIDE GAS, N.O.S.	(1),(2),(3),(4),(5)			10		z
3163	LIQUEFIED GAS, N.O.S.	(1),(2),(3),(4),(5)			10		z
1070	NITROUS OXIDE	(1),(2),(3),(4),(5)		18.0	10	0.68	g
		(1),(2),(3),(4),(5)		22.5	10	0.74	g
		(1),(2),(3),(4),(5)		25.0	10	0.75	g
3157	LIQUEFIED GAS, OXIDIZING, N.O.S.	(1),(2),(3),(4),(5)			10		z
1010	1.2-BUTADIENE, INHIBITED or	(1),(2),(3),(4),(5)		1.0	10	0.59	f
1010	1.3-BUTADIENE, INHIBITED or	(1),(2),(3),(4),(5)		1.0	10	0.55	f
1010	MIXTURES OF 1,3-BUTADIENE AND HYDROCARBONS, INHIBITED	(1),(2),(3),(4),(5)			10	0.5	f,j
1011	BUTANE	(1),(2),(3),(4),(5)		1.0	10	0.51	
1012	BUTYLENES MIXTURE or	(1),(2),(3),(4),(5)			10	0.5	j
1012	1-BUTYLENE or	(1),(2),(3),(4),(5)		1.0	10	0.53	
1012	CIS-2-BUTENE or	(1),(2),(3),(4),(5)		1.0	10	0.55	
1012	TRANS-2-BUTYLENE	(1),(2),(3),(4),(5)		1.0	10	0.54	
1027	CYCLOPROPANE	(1),(2),(3),(4),(5)		2.0	10	0.53	
1030	1,1-DIFLUOROETHANE (REFRIGERANT GAS R 152a)	(1),(2),(3),(4),(5)		1.8	10	0.79	
1032	DIMETHYLAMINE, ANHYDROUS	(1),(2),(3),(4),(5)		1.0	10	0.59	b
1033	DIMETHYL ETHER	(1),(2),(3),(4),(5)		1.8	10	0.58	
1035	ETHANE	(1),(2),(3),(4),(5)		9.5	10	0.25	g
		(1),(2),(3),(4),(5)		12	10	0.29	g
		(1),(2),(3),(4),(5)		30.0	10	0.39	g
1036	ETHYLAMINE	(1),(2),(3),(4),(5)		1.0	10	0.61	b
1037	ETHYL CHLORIDE	(1),(2),(3),(4),(5)		1.0	10	0.80	a
1039	ETHYL METHYL ETHER	(1),(2),(3),(4),(5)		1	10	0.64	
1041	ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE, with more than 9% ethylene oxide but not more than 87%	(1),(2),(3),(4),(5)		19 25	10 10	0.66 0.75	g g

Identification No	Name of the substance or article	Receptacles	TEST			FILLING	Special requirements
			PRESSURE		PERIOD (years) */	MAX. FILL. ratio kg/l or MPa or Vol %	
			X working pressure	MPa			
1055	ISOBUTYLENE	(1),(2),(3),(4),(5)		1.0	10	0.52	
1060	METHYLACETYLENE AND PROPADIENE MIXTURE, STABILIZED	(1),(2),(3),(4),(5)			10		c,f,j
	Propadiene with 1% to 4% methylacetylene	(1),(2),(3),(4),(5)		2.2	10	0.50	c,f
1061	METHYLAMINE, ANHYDROUS	(1),(2),(3),(4),(5)		1.3	10	0.58	b
1063	METHYL CHLORIDE (REFRIGERANT GAS R 40)	(1),(2),(3),(4),(5)		1.7	10	0.81	a
1077	PROPYLENE	(1),(2),(3),(4),(5)		3.0	10	0.43	
1081	TETRAFLUOROETHYLENE, INHIBITED	(1),(2),(3),(4),(5)		20.0	10	0.5 MPa	f
1083	TRIMETHYLAMINE, ANHYDROUS	(1),(2),(3),(4),(5)		1.0	10	0.56	b
1085	VINYL BROMIDE, INHIBITED	(1),(2),(3),(4),(5)		1.0	10	1.37	a,f
1086	VINYL CHLORIDE, INHIBITED	(1),(2),(3),(4),(5)		1.2	10	0.81	a,f
1087	VINYL METHYL ETHER, INHIBITED	(1),(2),(3),(4),(5)		1.0	10	0.67	f
1860	VINYL FLUORIDE, INHIBITED	(1),(2),(3),(4),(5)		25.0	10	0.64	a,f,g
1912	METHYLCHLORIDE AND METHYLENE CHLORIDE MIXTURE	(1),(2),(3),(4),(5)		1.7	10	0.81	a
1959	1,1-DIFLUOROETHYLENE (REFRIGERANT GAS R 1132a)	(1),(2),(3),(4),(5)		25	10	0.77	g
1969	ISOBUTANE	(1),(2),(3),(4),(5)		1.0	10	0.49	m
1978	PROPANE	(1),(2),(3),(4),(5)		2.5	10	0.42	m
2035	1,1,1-TRIFLUOROETHANE (REFRIGERANT GAS R 143a)	(1),(2),(3),(4),(5)		3.5	10	0.75	
2044	2,2-DIMETHYLPROPANE	(1),(2),(3),(4),(5)		1.0	10	0.53	
2200	PROPADIENE, INHIBITED	(1),(2),(3),(4),(5)		2.2	10	0.50	f
2419	BROMOTRIFLUORO-ETHYLENE	(1),(2),(3),(4),(5)		1.0	10	1.19	
2452	ETHYLACETYLENE, INHIBITED	(1),(2),(3),(4),(5)		1.0	10	0.57	c,f
2453	ETHYL FLUORIDE (REFRIGERANT GAS R 161)	(1),(2),(3),(4),(5)		3.0	10	0.57	
2454	METHYL FLUORIDE (REFRIGERANT GAS R 41)	(1),(2),(3),(4),(5)		30.0	10	0.36	

Identification No	Name of the substance or article	Receptacles	TEST			FILLING	Special requirements
			PRESSURE		PERIOD (years) */	MAX. FILL. ratio kg/l or MPa or Vol %	
			X working pressure	MPa			
2517	1-CHLORO-1,1-DIFLUORO-ETHANE (REFRIGERANT GAS R 142b)	(1),(2),(3),(4),(5)		1.0	10	0.99	
2601	CYCLOBUTANE	(1),(2),(3),(4),(5)		1.0	10	0.63	
3153	PERFLUORO(METHYL VINYL ETHER)	(1),(2),(3),(4),(5)		2.0	10	0.75	
3154	PERFLUORO(ETHYL VINYL ETHER)	(1),(2),(3),(4),(5)		1.0	10	0.98	
3252	DIFLUOROMETHANE (REFRIGERANT GAS R 32)	(1),(2),(3),(4),(5)		4.8	10	0.78	
1965	HYDROCARBON GAS MIXTURE, LIQUEFIED N.O.S.	(1),(2),(3),(4),(5)			10	**/	m, z
3354	INSECTICIDE GAS, FLAMMABLE, N.O.S	(1),(2),(3),(4),(5)			10		z
3161	LIQUEFIED GAS, FLAMMABLE, N.O.S.	(1),(2),(3),(4),(5)			10		z
1062	METHYL BROMIDE	(1),(2),(3),(4),(5)		1.0	5	1.51	a
1581	CHLOROPICRIN AND METHYL BROMIDE MIXTURE	(1),(2),(3),(4),(5)		1.0	5	1.51	a
1582	CHLOROPICRIN AND METHYL CHLORIDE MIXTURE	(1),(2),(3),(4),(5)		1.7	5	0.81	a
2191	SULPHURYL FLUORIDE	(1),(2),(3),(4),(5)		5.0	5	1.10	k
1967	INSECTICIDE GAS, TOXIC, N.O.S.	(1),(2),(3),(4),(5)			5		z
3162	LIQUEFIED GAS, TOXIC, N.O.S.	(1),(2),(3),(4),(5)			5		z
1026	CYANOGEN	(1),(2),(3),(4),(5)		10.0	5	0.70	k
1040	ETHYLENE OXIDE, or ETHYLENE OXIDE WITH NITROGEN up to a total pressure of 1MPa (10 bar) at 50 °C	(1),(2),(3),(4),(5)		1.5	5	0.78	f
1053	HYDROGEN SULPHIDE	(1),(2),(3),(4),(5)		5.5	5	0.67	k,o
1064	METHYL MERCAPTAN	(1),(2),(3),(4),(5)		1.0	5	0.78	k,o
1082	TRIFLUOROCHLOROETHYLENE, INHIBITED	(1),(2),(3),(4),(5)		1.9	5	1.13	f,k
2188	ARSINE	(1),(5)		4.2	5	1.10	e,l,o
2192	GERMANE ***/	(1),(5)		25.0	5	1.02	e,g,l,o
2199	PHOSPHINE ***/	(1),(5)		25.0	5	0.51	e,g,l,o
		(1),(5)		25.0	5	0.51	e,g,l,o

Identification No	Name of the substance or article	Receptacles	TEST			FILLING	Special requirements
			PRESSURE		PERIOD (years) */	MAX. FILL. ratio kg/l or MPa or Vol %	
			X working pressure	MPa			
2202	HYDROGEN SELENIDE, ANHYDROUS	(1),(5)		3.1	5	1.60	e,l
2204	CARBONYL SULPHIDE	(1),(2),(3),(4),(5)		2.6	5	0.84	k
2676	STIBINE	(1),(5)		2.0	5	1.2	e,l
3300	ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 87% ethylene oxide	(1),(2),(3),(4),(5)		2.8	5	0.73	f
3355	INSECTICIDE GAS, TOXIC, FLAMMABLE N.O.S.	(1),(2),(3),(4),(5)			5		z
3160	LIQUEFIED GAS, TOXIC, FLAMMABLE N.O.S.	(1),(2),(3),(4),(5)			5		z
1005	AMMONIA, ANHYDROUS	(1),(2),(3),(4),(5)		3.3	5	0.53	b
1017	CHLORINE	(1),(2),(3),(4),(5)		2.2	5	1.25	a
1048	HYDROGEN BROMIDE, ANHYDROUS	(1),(2),(3),(4),(5)		6.0	5	1.54	a,o
1050	HYDROGEN CHLORIDE, ANHYDROUS	(1),(2),(3),(4),(5)		10.0	5	0.30	a,g,o
		(1),(2),(3),(4),(5)		12.0	5	0.56	a,g,o
		(1),(2),(3),(4),(5)		15.0	5	0.67	a,g,o
		(1),(2),(3),(4),(5)		20.0	5	0.74	a,g,o
1069	NITROSYL CHLORIDE	(1),(5)		1.3	5	1.10	e,l
1076	PHOSGENE	(1),(3),(5)		2.0	5	1.23	e,l
1079	SULPHUR DIOXIDE	(1),(2),(3),(4),(5)		1.4	5	1.23	
1589	CYANOGEN CHLORIDE, INHIBITED	(1),(5)		2.0	5	1.03	e,f,l
1741	BORON TRICHLORIDE	(1),(2),(3),(4),(5)		1.0	5	1.19	
2194	SELENIUM HEXAFLUORIDE	(1),(5)		3.6	5 5	1.46	e,g,l
2195	TELLURIUM HEXAFLUORIDE	(1),(5)		2.0	5	1.0	e,l
2196	TUNGSTEN HEXAFLUORIDE	(1),(5)		1.0	5	2.70	a,e,l
2197	HYDROGEN IODIDE, ANHYDROUS	(1),(2),(3),(4),(5)		2.3	5	2.25	a,o
2418	SULPHUR TETRAFLUORIDE	(1),(5)		3	5	0.91	e,l
2420	HEXAFLUOROACETONE	(1),(2),(3),(4),(5)		2.2	5	1.08	
3057	TRIFLUOROACETYL CHLORIDE	(1),(2),(3),(4),(5)		1.7	5	1.17	
3308	LIQUEFIED GAS, TOXIC, CORROSIVE N.O.S.	(1),(2),(3),(4),(5)			5		z
3083	PERCHLORYL FLUORIDE	(1),(2),(3),(4),(5)		3.3	5	1.21	e,k,l
3307	LIQUEFIED GAS, TOXIC, OXIDIZING N.O.S.	(1),(2),(3),(4),(5)			5		z
2189	DICHLOROSILANE	(1),(2),(3),(4),(5)		1	5	0.90	
2534	METHYLCHLOROSILANE	(1),(2),(3),(4),(5)			5		j
3309	LIQUEFIED GAS, TOXIC, FLAMMABLE, CORROSIVE N.O.S.	(1),(2),(3),(4),(5)			5		z
1067	DINITROGEN TETROXIDE (NITROGEN DIOXIDE)	(1),(3),(5)		1.0	5	1.30	e,l
1749	CHLORINE TRIFLUORIDE	(1),(2),(3),(4),(5)		3.0	5	1.40	a

Identification No	Name of the substance or article	Receptacles	TEST			FILLING	Special requirements
			PRESSURE		PERIOD (years) */	MAX. FILL. ratio kg/l or MPa or Vol %	
			X working pressure	MPa			
1975	NITRIC OXIDE AND DINITROGEN TETROXIDE MIXTURE (NITRIC OXIDE AND NITROGEN DIOXIDE MIXTURE)	(1),(3),(5)			5		e,j,l
2548	CHLORINE PENTAFLUORIDE	(1),(5)		1.3	5	1.49	a,e,l
2901	BROMINE CHLORIDE	(1),(2),(3),(4),(5)		1.0	5	1.5	a
3310	LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE N.O.S.	(1),(2),(3),(4),(5)			5		z
2073	AMMONIA SOLUTION, relative density less than 0.88 at 15 °C						
	with more than 35% and not more than 40% ammonia	(1),(2),(3),(4),(5)		1.0	5	0.80	
	with more than 40% and not more than 50% ammonia	(1),(2),(3),(4),(5)		1.2	5	0.77	
1001	ACETYLENE , DISSOLVED	(1),(5)		6.0	10		c,h,i
3318	AMMONIA SOLUTION, relative density less than 0.880 at 15 °C in water, with more than 50% ammonia	(1),(2),(3),(5)			5		j

P 201	Packing instruction	P201

Type of packages

Gas samples of class 2

The general packing requirements of 4.1.4.1 when applicable shall be met.

201(a) Gas samples shall be at a pressure corresponding to ambient atmospheric pressure at the time the containment system is closed and this shall not exceed 105 kPa absolute.

201(b) The gases shall be contained in hermetically sealed glass or metal inner packagings with a maximum net quantity per package of 5 litres for flammable gases and 1 litre for toxic gases.

201(c) The outer packagings shall meet the packing group III performance level.

P 202	Packing instruction	P202

Type of packages

Air bag inflators, modules and seat pretensioners

see text as proposed in ST/SG/AC.10/C.3/1998/19)

P 203	Packing instruction	P203

[Type of receptacles

Cryogenic receptacles

The general packing requirements of 4.1.4.1 shall be met.

Particular instructions for closed cryogenic receptacles:

203(a) For non-flammable, non- toxic, refrigerated liquefied gases the degree of filling, at the filling temperature and at a pressure of 0.1 MPa (1 bar) shall not exceed 98% of the capacity.

203(b) For flammable refrigerated liquefied gases the degree of filling shall remain below the level at which, if the contents were raised to the temperature at which the vapour pressure equalled the opening pressure of the relief valve, the volume would reach 95% of the capacity at that temperature.

203(c) In the case of receptacles intended for the carriage of oxidising gases, the substances used to ensure the leakproofness of the joints or for the maintenance of the closures shall be compatible with the contents.

203(d) Receptacles shall be subjected to periodic inspections in accordance with the provisions of 6.2.1.5.

203(e) Periodic inspections shall be carried out every 10 years.

By derogation from this paragraph, the periodic inspection of receptacles which make use of composite materials (composite receptacles) shall be carried out at intervals determined by the competent authority which has approved the technical code for the design and construction.

P 203	Packing instruction (cont'd)	P203

Particular instructions for open cryogenic receptacles:

203(f) The receptacles shall be so insulated that they cannot become coated with dew or hoarfrost.

203(g) Open cryogenic receptacles are not allowed for refrigerated liquefied gases of Division 2.1, carbon dioxide, refrigerated liquid (UN 2187) and its mixtures.

203(h) Glass receptacles shall be protected by iron-wire baskets and placed in metal cases. The metal cases for the glass receptacles and the other receptacles shall be fitted with means of handling. Receptacles in glass are not allowed for [...] [?]

203(i) The openings of the receptacles shall be fitted with devices allowing gases to escape, preventing any splashing out of the liquid, and so fixed that they cannot fall out.

203(j) In the case of refrigerated liquid oxygen (UN 1073) of Division 2.2 and mixtures thereof, the devices referred to above and the absorbent insulating material surrounding the glass receptacles shall be made of non-combustible materials.]

Proposal 4

6.2 Requirements for the construction and testing of pressure receptacles for gases including pressure receptacles which are elements of MEGCs

6.2.1 General requirements

6.2.1.1 Design and construction

6.2.1.1.1 Pressure receptacles and their closures shall be designed, manufactured, tested and equipped in such a way as to withstand all conditions to which they will be subjected during their normal use and during normal transport conditions.

6.2.1.1.2 In recognition of scientific and technological advances, and recognizing that pressure receptacles other than those that are marked with a UN certification marking may be used on a national or regional basis, pressure receptacles conforming to requirements other than those specified in these Model Regulations may be used if approved by the competent authority in the countries of transport and use and provided that the competent authority determines that the alternative requirements provide at least the same level of safety as if the pressure receptacle were designed in accordance with the requirements of this Chapter.

6.2.1.1.3 Pressure receptacles and their closures shall be made of suitable materials which shall be resistant to brittle fracture and to stress corrosion cracking.

6.2.1.1.4 For welded pressure receptacles only materials of high quality weldability whose adequate impact strength at an ambient temperature of -20 °C can be guaranteed, particularly in the weld seams and the zones adjacent thereto, shall be used. Welds shall be skilfully made and shall afford the fullest safety. Any additional thickness to allow for corrosion shall not be taken into consideration in calculating the thickness of the walls.

6.2.1.1.5 Pressure receptacles for acetylene, dissolved, UN 1001 shall be filled entirely with a porous material, uniformly distributed, of a type approved by the competent authority and which:

(a) does not attack the pressure receptacles or form harmful or dangerous compounds either with the acetylene or with the solvent;

(b) is capable of preventing the spread of decomposition of the acetylene in the mass.

The solvent shall not attack the pressure receptacles.

6.2.1.1.6 The following requirements apply to the construction of closed cryogenic pressure receptacles for refrigerated liquefied gases:

- All the mechanical and technological characteristics of the metal used shall be established for each pressure receptacle at the initial inspection; with regard to the impact strength and the bending coefficient;

- The pressure receptacles shall be thermally insulated. The thermal insulation shall be protected against impact by means of continuous sheathing. If the space between the pressure receptacle and the sheathing is airless (vacuum-insulation), the protective

sheathing shall be designed to withstand without deformation an external pressure of at least 100 kPa (1 bar). If the sheathing is so closed as to be gas-tight (e.g. in the case of vacuum-insulation), a device shall be provided to prevent any dangerous pressure from developing in the insulating layer in the event of inadequate gas-tightness of the pressure receptacle or its fittings. The device shall prevent moisture from penetrating into the insulation.

6.2.1.1.7 The test pressure of receptacles is provided in P200 for cylinders, tubes, pressure drums and bundle of cylinders. [The test pressure for cryogenic receptacles, closed, is not less than 1.3 times the maximum allowable working pressure (MAWP) increased by 1 bar for vacuum insulated receptacles.]

6.2.1.2 Materials of pressure receptacles

6.2.1.2.1 The materials of which the pressure receptacles and their closures are made and all substances that might come into contact shall be compatible with the contents and shall not form harmful or dangerous compounds therewith. This requirement is met by complying with the following standards:

EN ISO 11114-1:1997	Compatibility of cylinder and valve materials with gas contents - Part 1: Metallic materials
prEN ISO/ DIS 11114-2	Compatibility of cylinder and valve materials with gas contents - Part 2: Non-metallic materials

Additionally, the material shall resist brittle fracture at the lowest working temperature of the receptacle and its fittings.

6.2.1.3 Service equipment

6.2.1.3.1 Valves, piping, fittings and equipment subjected to pressure shall have at least the same test pressure as the receptacles.

6.2.1.3.2 Service equipment shall be so arranged as to be protected against the risk of being wrenched off or damaged during handling and transport. Manifold piping leading to shut-off valves shall be sufficiently flexible to protect the valves and the piping from shearing. The filling and discharge and any protective caps shall be capable of being secured against unintended opening. Valves shall be protected as specified in section 4.1.6.

6.2.1.3.3 Pressure receptacles which are not capable of being carried manually or rolled, shall be fitted with devices (skids, rings, straps,) ensuring that they can be safely handled by mechanical means and so arranged as not to impair the strength of, nor cause undue stresses in, the wall of the receptacle.

6.2.1.3.4 [When fitted], safety relief devices on manifolded horizontal pressure receptacles filled with flammable gas shall be arranged to discharge upward and unobstructed to the open air in such a manner as to prevent any impingement of escaping gas upon the containers. Individual pressure receptacles shall be equipped with approved pressure relief devices as required in P200. Manifold branch lines of individual shut-off valves shall be sufficiently flexible to prevent damage to the valves which otherwise might result from the use of rigid branch lines.

[6.2.1.3.5 Cryogenic receptacles, closed, shall be fitted with one or more pressure-relief devices to protect the vessel against excess pressure. Excess pressure means a pressure in excess of 110% of the MAWP due to normal heat leak or in excess of the test pressure due to the loss of vacuum for vacuum insulated receptacles or due to the failure in the open position of a pressure build up system. The valves shall be so constructed as to work perfectly even at their lowest working temperature. Their reliability of functioning at that temperature shall be established and checked by testing each valve or a sample of valves of the same type of construction. The vents and safety valves of receptacles shall be so designed as to prevent the liquid from splashing out.]

6.2.1.3.6 Receptacles whose filling is measured by volume shall be provided with a level indicator.

6.2.1.3.7 The following standards pertain to closures and their protection:

ISO/AWI 14245	Specification and testing for liquefied petroleum gas (LPG) valves self closing
ISO/AWI 15995	Specifications and testing for manually operated liquefied petroleum gas valves
ISO/FDIS 11117	Gas cylinders - Valve protection caps and valve guards for industrial and medical gas cylinders- design, construction and tests
EN/ISO 13340	Gas cylinder valves –Valves for non-refillable cylinders
ISO/DIS 10297.2	Gas cylinder valves - Specification and type testing. All gases except LPG

6.2.1.4 Requirements for manufacturers

6.2.1.4.1 The manufacturer shall be technically able and shall possess all suitable means required for the satisfactory manufacture of pressure receptacles; this relates in particular to qualified personnel

(a) to supervise the entire manufacturing process;

(b) to carry out joining of materials;

(c) to carry out the relevant tests.

6.2.1.4.2 The proficiency test of a manufacturer shall in all instances be carried out by a testing and certifying body approved by the competent authority of the country of origin. The particular certification process the manufacturer intends to apply shall be taken into consideration.

6.2.1.5 Requirements for testing and certifying bodies

6.2.1.5.1 Testing and certifying bodies shall be independent from manufacturing enterprises and technologically competent to the degree required.

6.2.1.6 Design and construction requirements for multi-modal transport

[6.2.1.6.1 Pressure receptacles designed, constructed, inspected, tested and approved to requirements other than those specified in these Model Regulations shall not be marked with the UN certification marking specified in this Chapter. For international transport, pressure receptacles approved under the provisions of this paragraph shall also be approved by the applicable competent authorities of the countries where the pressure receptacles will be used and transported.

[6.2.1.6.2 The following standards apply for the design and construction of UN marked and certified gas cylinders:]

ISO/DIS 9809-1	Transportable seamless steel gas cylinders - Design, construction and testing - Part 1: Quenched and tempered steel cylinders with tensile strength less than 1100 MPa *Note: The design stress factor F shall not be variable.*
ISO/DIS 9809-2	Transportable seamless steel gas cylinders - Design, construction and testing - Part 2: Quenched and tempered steel cylinders with tensile strength greater than or equal to 1100 MPa
ISO/DIS 9809-3	Transportable seamless steel gas cylinders - Design, construction and testing - Part 3: Normalised steel cylinders
ISO/DIS 7866	Refillable transportable seamless aluminium alloy for world-wide usage - Design, manufactured and acceptance *Note: the design stress factor F shall not be variable.* *Aluminium alloy 6351A is not authorised.*
ISO/CD 11119-1	Gas cylinders of composite material - specifications and test methods - Part 1: Hoop wrapped, metallic
ISO/CD 11119-1	Gas cylinders of composite material - specifications and test methods - Part 2: Fully wrapped, metallic
ISO/CD 11119-1	Gas cylinders of composite material - specifications and test methods - Part 3: Fully wrapped, non metallic
ISO/CD 3807-1	Dissolved acetylene cylinders - Basic requirements - Part 1 Cylinders without fusible plugs
ISO/CD 3807-2	Dissolved acetylene cylinders - Basic requirements - Part 2 Cylinders with fusible plugs
ISO/DIS 11118	Non-refillable gas cylinders - Specifications and test methods

[6.2.1.6.3 The following standards apply for the design and construction of UN marked and certified tubes:]

prEN ISO/DIS 11120	Gas cylinders - Refillable seamless steel gas cylinders, capacity between 150*l* and 3000*l* - Design and testing *Note: The design stress factor F shall not be variable.*

6.2.1.7 Requirements for pressure receptacles not designed, constructed and tested according to standards

6.2.1.7.1 Pressure receptacles not designed, constructed and tested according to standards listed in the table of 6.2.1.6.2 shall be designed, constructed and tested in accordance with the provisions of a technical code recognised by the competent authority and the requirements of 6.2.1 1 through 6.2.1.5 of this section.

6.2.1.7.2 [For metallic cylinders, tubes, pressure drums, bundles of cylinders, the construction shall be such that a minimum burst ratio (burst pressure divided by test pressure) is

1.60 for refillable pressure receptacles
2.00 for non-refillable pressure receptacles]

6.2.1.7.3 [For composite cylinders, tubes, pressure drums and bundles of cylinders which make use of composite materials i.e. comprising a liner hoop wrapped or fully wrapped with reinforcement material, the construction shall be such that a minimum burst ratio (burst pressure divided by test pressure) is

1.67 for hoop wrapped pressure receptacles
2.00 for fully wrapped pressure receptacles]

[6.2.1.8 Approval of pressure receptacles

6.2.1.8.1 [The conformity of pressure receptacles shall be assessed to the requirements of the competent authority. Pressure receptacles shall be examined, tested and approved by a testing and certifying body approved by the competent authority of the country of origin, on the basis of the technical documentation and declaration of the manufacturer on compliance with the relevant provisions of this Class.

The technical documentation shall include full specifications on design and construction, and full documentation on the manufacturing and testing.]

6.2.1.8.2 [The requirements of quality assurance systems shall be deemed to be complied with, if they conform to the requirements of the competent authority.]

6.2.1.9 Initial inspection and tests

6.2.1.9.1 New pressure receptacles shall be subjected to testing and inspection after manufacture in accordance with the following:

On an adequate sample of pressure receptacles:

(a) Testing of the mechanical characteristics of the material of construction;

(b) Verification of the minimum wall thickness;

(c) Checking the homogeneity of the material for each manufacturing batch, and inspection of the external and internal condition of the pressure receptacles;

For all pressure receptacles:

(d) A hydraulic pressure test. Pressure receptacles shall withstand the test pressure without undergoing permanent deformation or exhibiting cracks;

NOTE: With the agreement of the testing and certifying body authorised by the competent authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.

(e) An inspection of the markings on the pressure receptacles, see sub-section 6.2.1.11;

(f) In addition, pressure receptacles intended for the transport of acetylene, dissolved, UN 1001 shall have an inspection of the nature of the porous material and the quantity of solvent.

6.2.1.9.2 Aluminium alloy shall be checked for intercrystalline corrosion.

6.2.1.10 Periodic inspection

6.2.1.10.1 Refillable pressure receptacles, with the exception of open cryogenic receptacles, shall be subjected to periodic inspections under the supervision of a body authorised by the competent authority, in accordance with the following:

(a) Check of the external conditions of the pressure receptacle and verification of the equipment and the external markings;

(b) Check of the internal conditions of the pressure receptacle (e.g. by weighing, internal inspection, checks of wall thickness);

(c) The hydraulic pressure test and, if necessary, verification of the characteristics of the material by suitable tests;

NOTE 1: With the agreement of the testing and certifying body authorised by the competent authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.

NOTE 2: With the agreement of the testing and certifying body authorised by the competent authority, the hydraulic pressure test of cylinders and tubes may be replaced by an equivalent method based on acoustic emission or based on ultrasound.

6.2.1.10.2 For pressure receptacles intended for the transport of acetylene, dissolved, UN 1001 only the external condition (corrosion, deformation), and the condition of the porous mass (loosening, settlement) shall be examined.

6.2.1.10.3 By derogation from paragraph 6.2.1.5.1(c) closed cryogenic pressure receptacles shall be subjected to external inspection and to a leakproofness test. The leakproofness test shall be carried out with the gas contained in the receptacle or with an inert gas. Checking shall be performed by means of a pressure gauge or by vacuum measurement. The thermal insulation need not be removed.

6.2.1.10.4 The following standards pertain to the periodic inspection and testing of cylinders:

ISO 6406: 1992	Periodic inspection and testing of seamless steel gas cylinders
ISO 10460:1993	Welded carbon steel gas cylinders - Periodic inspection and testing
ISO 10461:1993	Seamless aluminium - alloy gas cylinders - Periodic inspection and testing
ISO 10462:1993	Cylinders for dissolved acetylene - Periodic inspection and testing
ISO 10464:1993	Liquefied petroleum gas cylinders - Periodic inspection and testing
PrEN ISO/DIS 11623	Composite gas cylinders - Periodic inspection and testing

6.2.1.11 Marking of receptacles

6.2.1.11.1 Refillable pressure receptacles shall be marked clearly, legibly and permanently, as follows:

(a) The name or the mark of the manufacturer;

(b) The receptacles specification (the type specification or the standard used for the design);

(c) The serial number of the receptacle provided by the manufacturer;

(d) The mass of the receptacle;

(e) The test pressure;

(f) The date (month and year) of the initial inspection;

(g) The identification mark of the authorised body who carried out the tests and inspections;

(h) In the case of acetylene, dissolved UN 1001: the permitted filling pressure (see section 4.1.4.5) and the total of the mass of: the empty receptacle, the fittings and accessories, the porous material and the solvent;

(i) The water capacity in litres;

(j) The working pressure in the case of compressed gases;

(k) The letter "H" showing compatibility with gases with a risk of hydrogen embrittlement.

These marks shall be permanently affixed, (e.g. stamped, engraved, or etched) on the pressure receptacle. The markings shall be on the shoulder, top head or neck of the pressure receptacle or on a permanently affixed component of the pressure receptacle (e.g. welded collar). Other markings are allowed provided they are made in low stress areas other than the side wall and are not of a size and depth that will create harmful stress concentrations. Such marks shall not conflict with required markings.

6.2.1.11.2 In addition to the markings specified in section 6.2.1.6.1, each refillable pressure receptacle shall be marked indicating the date (year and month) of the last periodic inspection and the registered mark of the test body authorized by the competent authority of the country of use.

6.2.1.11.3 The requirements of 6.2.1.11.1 and 6.2.1.11.2 are met when the marking has been applied according to ISO/CD 13769: Gas cylinders-Stampmarking.

6.2.1.11.4 Non-refillable pressure receptacles shall be marked clearly, legibly, and durably, as follows:

(a) The name or the mark of the manufacturer;

(b) The pressure receptacles specification (the type specification or the standard used for the design);

(c) The serial or batch number of the pressure receptacle provided by the manufacturer;

(d) The test pressure;

(e) The date (year and month) of manufacturing;

(f) The identification stamp of the authorised body who carried out the tests and inspections;

(g) The words "DO NOT REFILL"; this marking shall be a minimum of 6 mm in height.

These marks shall be permanently stencilled, stamped, engraved or etched on the pressure receptacle. Except when stencilled the markings shall be on the shoulder, top head or neck of the pressure receptacle or on a permanently affixed component of the pressure receptacle (e.g. welded collar). Other markings are allowed provided they are made in low stress areas other than the side wall and are not of a size and depth that will create harmful stress concentrations. Such marks shall not conflict with required markings.

6.2.1.11.5 [Pressure receptacles designed, manufactured and tested according the appropriate standards out of the reference list of 6.2.2 may in addition bear the UN mark. When affixed, the UN mark shall be followed by the country authorising the mark.]

Proposal 5

Proposed text for Part 5

5.2.2.2.1.2 Gas cylinders for Class 2 may, on account of their shape, orientation and securing mechanisms for transport, bear labels representative of those specified in this section, which have been reduced in size **according to ISO 7225**, for display on the non-cylindrical part (shoulder) of such cylinders.

For gas cylinders with an outside diameter lower or equal to 75mm, the cylindrical part may also be used.

Proposal 6

Proposed texts for MEGC's in Part 4

The existing 4.2.4 should be renumbered as 4.2.5 and replaced by the following text.

4.2.4 General provisions for the use of multiple-element gas containers (MEGCs)

4.2.4.1 This section provides general requirements applicable to the use of multiple-element gas containers (MEGCs) for the transport of non-refrigerated gases.

4.2.4.2 MEGCs shall conform to the design, construction, inspection and testing requirements detailed in 6.7.5. The elements of MEGC's shall be periodically inspected according to the provisions set out in P200 and in 6.2.

4.2.4.3 During transport, MEGCs shall be adequately protected against damage to the elements and service equipment resulting from lateral and longitudinal impact and overturning. If the elements and service equipment are so constructed as to withstand impact or overturning they need not be protected in this way. Examples of such protection are given in **6.7.5.10.4**.

4.2.4.4 Toxic gases and gas mixtures with an $LC_{50} \leq 200$ ppm shall not be authorised for transport in MEGCs.

4.2.4.5 Empty MEGCs not cleaned and not gas-free shall comply with the same requirements as MEGCs filled with the previous gas.

4.2.4.6 MEGC's shall not be charged or filled after they become due for periodic inspection. MEGC's may be transported after the expiry of the time limit set for the periodic inspection prescribed.

4.2.5 Filling

4.2.5.1 Prior to filling the shipper shall ensure that the MEGC is authorized for the gas to be transported.

4.2.5.2 Elements of MEGC's shall be filled according to the filling ratios determined in packing instruction P200.

4.2.5.3 MEGC's shall not be filled above their maximum permissible gross mass.

4.2.5.4 The isolation valves shall be closed after filling and remain closed during transport. Toxic gases of division 2.3 shall only be transported in multiple-element gas containers where each element is equipped with an isolation valve.

4.2.5.5 The opening(s) for filling shall be closed by caps or plugs. The leakproofness of the closures and equipment shall be verified by the consignor after filling.

4.2.5.6 MEGCs shall not be offered for transport or filling:

(a) when leaking;
(b) when damaged to such an extent that the integrity of the elements, the lifting or securing arrangements may be affected; and
(c) unless the service equipment has been examined and found to be in good working order;
(d) unless the markings necessary for filling are legible or;
(e) unless for the purpose of repair in accordance with these regulations.

Proposal 7

Proposed texts for MEGC's in Part 6

6.7.5 Requirements for the design, construction, inspection and testing of multiple-element gas containers (MEGC's) intended for the transport of non-refrigerated gases

6.7.5.1 *Definitions*

For the purposes of this section:

*Element*s are restricted to cylinders, tubes or bundle of cylinders;

Manifold means an assembly of piping and valves connecting the filling/discharge openings of the elements;

Service equipment means measuring instruments and filling, discharge, venting and safety devices;

Structural equipment means the reinforcing, fastening, protective and stabilizing members external to the elements;

Leakproofness test means a test using gas subjecting the elements and its service equipment to an effective internal pressure of not less than 20% of the test pressure;

Maximum permissible gross mass (MPGM) means the sum of the tare mass of the multiple-element gas container and the heaviest load authorized for transport.

6.7.5.2 *General design and construction requirements*

6.7.5.2.1 The multiple-element gas container shall be capable of being loaded and discharged without the removal of its structural equipment. It shall possess stabilizing members external to the elements, and shall be capable of being lifted also when full. It shall be designed primarily to be loaded onto a transport vehicle or ship and shall be equipped with skids, mountings or accessories to facilitate mechanical handling.

6.7.5.2.2 MEGC's shall be designed, manufactured, tested and equipped in such a way as to withstand all conditions to which they will subjected during their normal use and during normal transport conditions. The design shall take into account the effects of dynamic loading and fatigue.

6.7.5.2.3 Elements of a MEGC shall be made of seamless steel and be constructed according to section 6.2. Elements shall be of the same design type.

6.7.5.2.4 Elements of MEGC's, fittings and pipework shall be constructed of materials which are:

(a) substantially immune to attack by the gas(es) intended to be transported(see ISO 11114); or

(b) properly passivated or neutralized by chemical reaction.

6.7.5.2.5 Contact between dissimilar metals which could result in damage by galvanic action shall be avoided.

6.7.5.2.6 The materials of the MEGC, including any devices, gaskets, and accessories, shall not adversely affect the gases intended for transport in the MEGC.

6.7.5.2.7 MEGC's shall be designed and constructed with supports to provide a secure base during transport and with suitable lifting and tie-down attachments.

6.7.5.2.8 MEGC's shall be designed to withstand, without loss of contents, at least the internal pressure due to the contents, and the static, dynamic and thermal loads during normal conditions of handling and transport. The design shall demonstrate that the effects of fatigue, caused by repeated application of these loads through the expected life of the multiple-element gas container, have been taken into account.

6.7.5.2.9 MEGC's and their fastenings shall, under the maximum permissible load, be capable of absorbing the following separately applied static forces:

(a) in the direction of travel: twice the MPGM multiplied by the acceleration due to gravity (g) */;

(b) horizontally at right angles to the direction of travel: the MPGM (when the direction of travel is not clearly determined, the forces shall be equal to twice the MPGM) multiplied by the acceleration due to gravity (g) */;

(c) vertically upwards: the MPGM multiplied by the acceleration due to gravity (g) */; and

(d) vertically downwards: twice the MPGM (total loading including the effect of gravity) multiplied by the acceleration due to gravity (g) */.

6.7.5.2.10 Under the stresses defined above, the stress at the most severely stressed point of the elements shall not exceed the values given in the relevant standards of section 6.2.1.6 or if or, if the elements are not designed, constructed and tested according to those standards, in section 6.2.1.7.

6.7.5.2.11 Under each of the forces in 6.7.5.2.9, the safety factor for the framework and fastenings to be observed shall be as follows:

(a) for steels having a clearly defined yield point, a safety factor of 1.5 in relation to the guaranteed yield strength; or

(b) for steels with no clearly defined yield point, a safety factor of 1.5 in relation to the guaranteed 0.2% proof strength and, for austenitic steels, the 1% proof strength.

6.7.5.2.12 MEGC's intended for the transport of flammable gases shall be capable of being electrically earthed.

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*/ *For calculation purposes* $g = 9{,}81\ m/s^2$.

6.7.5.2.13 The elements shall be secured in a manner that prevents undesired movement in relation to the structure and the concentration of local stresses.

6.7.5.3 ***Service equipment***

6.7.5.3.1 Service equipment shall be so arranged as to be protected against the risk of being wrenched off or damaged during handling and transport. When the connection between the frame and the elements allows relative movement between the sub-assemblies, the equipment shall be so fastened as to permit such movement without risk of damage to working parts. The manifolds, the discharge fittings (pipe sockets, shut-off devices), the stop-valves shall be protected against the danger of being wrenched off by external forces. Manifold piping leading to shut-off valves shall be sufficiently flexible to protect the valves and the piping from shearing. The filling and discharge devices (including flanges or threaded plugs) and any protective caps shall be capable of being secured against unintended opening.

6.7.5.3.2 Each element intended for the transport of toxic gases division 2.3 shall be fitted with a valve. The manifold for liquefied toxic gases division 2.3 shall be so designed that the elements can be filled separately and be kept isolated by a valve capable of being sealed. For the transport of flammable gases of division 2.1, the elements shall be isolated by a valve into assemblies of not more than 3000 litres.

6.7.5.3.3 For filling and discharge openings of the MEGC two valves in series shall be placed in an accessible position on each discharge and filling pipe. One of the valves may be a non-return valve. The filling and discharge devices may be fitted to a manifold. For sections of piping which can be closed at both ends and where liquid product can be trapped a pressure-relief valve shall be provided to prevent excessive pressure build-up.

6.7.5.3.4 The main isolation valves on a multiple-element gas container shall be clearly marked to indicate its direction of closure.

6.7.5.3.5 Each stop-valve or other means of closure shall be designed and constructed to withstand a pressure equal to or greater than 1.5 times the test pressure of the MEGC. All stop-valves with screwed spindles shall close by a clockwise motion of the handwheel. For other stop-valves the position (open or closed) and direction of closure shall be clearly indicated. All stop-valves shall be designed and positioned to prevent unintentional opening.

6.7.5.3.6 Piping shall be designed, constructed and installed so as to avoid the risk of damage due to expansion and contraction, mechanical shock and vibration. The relevant provisions of [prENWI70] shall be met.

6.7.5.3.7 Joints in tubing shall be brazed or have an equally strong metal union. The melting point of brazing materials shall be no lower than 525 °C.

6.7.5.3.8 The rated pressure of the service equipment and of the manifold shall be not less than two thirds of the test pressure of the elements.

Ductile metals shall be used in the construction of valves or accessories.

6.7.5.4 ***Pressure-relief devices***

6.7.5.4.1 MEGCs used for the transport of of non-flammable, non-toxic, high-pressure liquefied gases may be provided with one or more pressure-relief devices. Every element or group of elements of a multiple-element gas container that can be isolated shall then be fitted with one or more pressure relief-devices. The pressure-relief devices shall open automatically at a pressure between 100 and 120 percent of the test pressure. The pressure-relief devices shall be of a type that will resist dynamic forces including liquid surge (see for example CGA S-1.1-1994).

6.7.5.4.2 Pressure-relief devices, when fitted, shall be designed to prevent the entry of foreign matter, the leakage of gas and the development of any dangerous excess pressure.

6.7.5.4.3 MEGC's used for the transport of certain non-refrigerated gases identified in instructions T50 in 4.2.5.2.8 {shall/may} have a pressure-relief device approved by the competent authority. Unless a multiple-element gas container in dedicated service is fitted with an approved relief device constructed of materials compatible with the load, such device (shall) comprise a frangible disc preceding a spring-loaded device. The space between the frangible disc and the device may be provided with a pressure gauge or a suitable telltale indicator. This arrangement permits the detection of disc rupture, pinholing or leakage which could cause a malfunction of the pressure-relief device. The frangible discs shall rupture at a nominal pressure 10% above the start-to-discharge pressure of the spring-loaded relief device.

6.7.5.4.4 In the case of multi-purpose MEGCs used for the transport of low-pressure liquefied gases, the pressure-relief devices shall open at a pressure indicated in 6.7.3.7.1 for the gas having the highest maximum allowable pressure of the gases allowed to be transported in the MEGC.

6.7.5.5 ***Capacity of relief devices*** *(sub-section to be reviewed by CGA before next meeting)*

6.7.5.5.1 The combined delivery capacity of the relief devices when fitted shall be sufficient that, in the event of total fire engulfment, the pressure (including accumulation) inside the elements intended for the transport of gases does not exceed 120% of the set pressure of the relief device. Spring-loaded relief devices may be used to achieve the full relief capacity prescribed in the case of low pressure liquefied gases. In the case of multi-purpose elements, the combined delivery capacity of the pressure-relief devices shall be taken for the gas which requires the highest delivery capacity of the gases allowed to be transported in MEGCs.

6.7.5.5.2 To determine the total required capacity of the relief devices installed on the elements for the transport of low pressure liquefied gases, the thermodynamic properties of the gas have to be considered (see for example CGA S-1.2-1995).

6.7.5.5.3 To determine the total required capacity of the relief devices installed on the elements for the transport of high pressure liquefied gases, the thermodynamic properties of the gas have to be considered (see for example CGA S-1.1-1994).

6.7.5.6 ***Marking of pressure-relief devices*** *(sub-section to be reviewed by CGA before next meeting)*

6.7.5.6.1 Spring loaded pressure-relief devices [shall be plainly and permanently marked with the following:

(a) the pressure (in bar or kPa) at which it is set to discharge;

(b) the allowable tolerance at the discharge pressure;

(c) the rated flow capacity of the device in standard cubic meters of air per second (m^3/s);

When practicable, the following information shall also be shown:

(d) the manufacturer's name and relevant catalogue number.

6.7.5.6.2 The rated flow capacity marked on the frangible disk shall be determined according to CGA S-1.1-1994.

6.7.5.6.3 The rated flow capacity marked on the pressure-relief devices for low pressure liquefied gases shall be determined according to ISO 4126-1:1996.

6.7.5.7 ***Connections to pressure-relief devices*** *(sub-section to be reviewed by CGA before next meeting)*

6.7.5.7.1 Connections to pressure-relief devices shall be of sufficient size to enable the required discharge to pass unrestricted to the safety device. No stop-valve shall be installed between the element and the pressure-relief devices except when duplicate devices are provided for maintenance or other reasons and the stop-valves serving the devices actually in use are locked open or the stop-valves are interlocked so that at least one of the duplicate devices is always operable and capable of meeting the requirements of 6.6.5.6. There shall be no obstruction in an opening leading to a vent or pressure-relief device which might restrict or cut-off the flow from the element to that device. Vents from the pressure-relief devices, when used, shall deliver the relieved vapour or liquid to the atmosphere in conditions of minimum backpressure on the relieving device.

6.7.5.8 ***Siting of pressure-relief devices*** *(sub-section to be reviewed by CGA before next meeting)*

6.7.5.8.1 All pressure-relief devices shall under maximum filling conditions be situated in the vapour space of the elements for the transport of liquefied gases.
The devices when fitted shall be so arranged as to ensure that the escaping vapour is discharged upwards and unrestrictedly. For flammable and oxidising gases, the escaping gas shall be directed away from the element in such a manner that it cannot impinge upon the other elements. Protective devices which deflect the flow of gas are permissible provided the required relief-device capacity is not reduced.

6.7.5.8.2 Arrangements shall be made to prevent access to the pressure-relief devices by unauthorized persons and to protect the devices from damage caused by the MEGC overturning.

6.7.5.9 ***Gauging devices***

6.7.5.9.1 When a MEGC is intended to be filled by mass/weight it shall be equipped with one or more gauging devices. Level-gauges made of glass or other fragile material shall not be used.

6.7.5.10 ***MEGC supports, frameworks, lifting and tie-down attachments***

6.7.5.10.2 The combined stresses caused by element mountings (e.g. cradles, frameworks, etc.) and MEGC lifting and tie-down attachments shall not cause excessive stress in any element. Permanent lifting and tie-down attachments shall be fitted to all MEGCs. In no case shall mountings or attachments be welded onto the elements.

6.7.5.10.3 In the design of supports and frameworks the effects of environmental corrosion shall be taken into account.

6.7.5.10.4 When MEGCs are not protected during transport, according to 4.2.4.3, the elements and service equipment shall be protected against damage resulting from lateral or longitudinal impact or overturning. External fittings shall be protected so as to preclude the release of the elements contents upon impact or overturning of the MEGC on its fittings. Particular attention shall be paid to the protection of the manifold. Examples of protection include:

(a) protection against lateral impact which may consist of longitudinal bars;

(b) protection against overturning which may consist of reinforcement rings or bars fixed across the frame;

(c) protection against rear impact which may consist of a bumper or frame;

(d) protection of the elements and service equipment against damage from impact or overturning by use of an ISO frame in accordance with the relevant provisions of ISO 1496-3:1995.

6.7.5.11 ***Design approval***

6.7.5.11.1 The competent authority or its authorized body shall issue a design approval certificate for any new design of a MEGC. This certificate shall attest that the MEGC has been surveyed by that authority, is suitable for its intended purpose and meets the requirements of this Chapter and when appropriate the provisions for gases provided in instructions P200. When a series of MEGC's are manufactured without change in the design, the certificate shall be valid for the entire series. The certificate shall refer to the prototype test report, the materials of construction of the manifold, the standards to which the elements are made and an approval number. The approval number shall consist of the distinguishing sign or mark of the State in whose territory the approval was granted, i.e. the distinguishing sign for use in international traffic, as prescribed by the Convention on Road Traffic, Vienna 1968, and a registration number. Any alternative arrangements according to 6.6.1.2 shall be indicated on the certificate. A design approval may serve for the approval of smaller MEGC's made of materials of the same kind and thickness, by the same fabrication techniques and with identical supports, equivalent closures and other appurtenances.

6.7.5.11.2 The prototype test report for the design approval shall include at least the following:

(a) the results of the applicable framework test specified in ISO 1496-3:1995;

(b) the results of the initial inspection and test in 6.7.5.12.3;

(d) certification documents verifying that cylinders and tubes comply with the applicable standards.

6.7.5.12 ***Inspection and testing***

6.7.5.12.1 For MEGCs meeting the definition of container in the CSC, a prototype representing each design shall be subjected to an impact test. The prototype MEGC shall be shown to be capable of absorbing the forces resulting from an impact not less than 4 times (4 g) the MPGM of the fully loaded MEGC at a duration typical of the mechanical shocks experienced in rail transport. The following is a listing of standards describing methods acceptable for performing the impact test:

Association of American Railroads,
Manual of Standards and Recommended Practices,
Specifications for Acceptability of Tank Containers (AAR.600), 1992

Canadian Standards Association (CSA),
Highway Tanks and Portable Tanks for the Transportation of Dangerous Goods
(B620-1987)

Deutsche Bahn AG
Zentralbereich Technik, Minden
Transportable tanks, longitudinal dynamic impact test

Société Nationale des Chemins de Fer Français
C.N.E.S.T. 002-1966.
Tank containers, longitudinal external stresses and dynamic impact tests

Spoornet, South Africa
Engineering Development Centre (EDC)
Testing of ISO Tank Containers
Method EDC/TES/023/000/1991-06

6.7.5.12.2 The elements and items of equipment of each MEGC shall be inspected and tested before being put into service for the first time (initial inspection and test). Thereafter MEGC shall be inspected at no more than five-year intervals An exceptional inspection and test shall be performed regardless of the last periodic inspection and test when necessary according to 6.7.5.12.5.

6.7.5.12.3 The initial inspection and test of a MEGC shall include a check of the design characteristics, an external examination of the MEGC and its fittings with due regard to the gases to be transported, and a pressure test referring to the test pressures according to P 200. The pressure test of the manifold may be performed as a hydraulic test or by using another liquid or gas with the agreement of the competent authority or its authorized body. Before the MEGC is placed into service, a leakproofness test and a test of the satisfactory operation of all service equipment shall also be performed. When the elements and their fittings have been pressure-tested separately, they shall be subjected together after assembly to a leakproofness test.

6.7.5.12.4 The 5 year periodic inspection shall include an external examination of the structure, the elements and the service equipment in accordance with 6.7.5.12.6. The elements and the piping shall be

When the elements and equipment have been pressure-tested separately, they shall be subjected together after assembly to a leakproofness test.

6.7.5.12.5 An exceptional inspection and test is necessary when the MEGC shows evidence of damaged or corroded areas, or leakage, or other conditions that indicate a deficiency that could affect the integrity of the MEGC. The extent of the exceptional inspection and test shall depend on the amount of damage or deterioration of the MEGC. It shall include at least the inspection required under 6.7.5.12.6

6.7.5.12.6 The examinations shall ensure that:

(a) the elements are inspected externally for pitting, corrosion, or abrasions, dents, distortions, defects in welds or any other conditions, including leakage, that might render the MEGC unsafe for transport;

(b) the piping, valves, and gaskets are inspected for corroded areas, defects, and other conditions, including leakage, that might render the MEGC unsafe for filling, discharge or transport;

(c) missing or loose bolts or nuts on any flanged connection or blank flange are replaced or tightened;

(d) all emergency devices and valves are free from corrosion, distortion and any damage or defect that could prevent their normal operation. Remote closure devices and self-closing stop-valves shall be operated to demonstrate proper operation;

(e) required markings on the MEGC are legible and in accordance with the applicable requirements; and

(f) the framework, the supports and the arrangements for lifting the MEGC are in satisfactory condition.

6.7.5.12.7 The inspections and tests in 6.7.5.12.1, 6.7.5.12.3, 6.7.5.12.4 and 6.7.5.12.5 shall be performed or witnessed by a body authorized by the competent authority. When the pressure test is a part of the inspection and test, the test pressure shall be the one indicated on the data plate of the MEGC. While under pressure, the MEGC shall be inspected for any leaks in the elements, piping or equipment.

6.7.5.12.8 When evidence of any unsafe condition is discovered, the MEGC shall not be returned to service until it has been corrected and the applicable tests and verifications are passed.

6.7.5.13 *Marking*

6.7.5.13.1 Every MEGC shall be fitted with a corrosion resistant metal plate permanently attached to the MEGC in a conspicuous place readily accessible for inspection. The elements shall be marked in accordance with 6.2. As a minimum at least the following information shall be marked on the plate by stamping or by any other similar method.

Country of manufacture

U Approval

N Country Number "AA"

Manufacturer's name or mark

Manufacturer's serial number

Authorized body for the design approval

Year of manufacture: year and month

Test pressure: _____bar/kPa gauge */

Design temperature range_____ °C to _____°C

Number of elements_____

Total water capacity _____litres

Initial pressure test date and [witness] identification

Date and type of most recent periodic tests

Year_____ Month_____

Stamp of expert who performed or witnessed the most recent test]

***NOTE**: No metal plate may be fixed to the elements.*

[6.6.5.13.2 The following information shall be marked on a metal plate firmly secured to the MEGC:

Name of the operator

Maximum permissible load mass _____kg

Working pressure at 15°C: _____bar gauge

Maximum permissible gross mass (MPGM)_____kg

Unladen (tare) mass _____kg

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*/ *The unit used shall be marked.*